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WORLD SWORDFISH FISHERIES

Volume IV

Latin America

Part B. Caribbean

Section 2. Cayman Islands and Cuba

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service

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WORLD SWORDFISH FISHERIES

An Analysis of Swordfish Fisheries, Market Trends, and Trade Patterns
Past-Present-Future

Volume IV.
Latin America

Part B. Caribbean

Section 2. Cayman Islands and Cuba

Prepared by
The Office of Science and Technology

Dennis M. Weidner

PENNSYLVANIA STATE UNIVERSITY
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PERSONAL OBSERVATIONS

"The Cayman Islands Government has decided to cease registering foreign-owned fishing vessels because of the impracticality of regulating these vessels. Those vessels still on our registry are being inspected and those that do not meet strict international standards will be removed. -- S.R. Fordham, Chief Marine Surveyor, October 8, 1993.

"Then, with his right hand he felt the difference in the pull of the line before he saw the slant change in the water. Then, as he leaned against the line and slapped his left hand hard and fast against his thigh he saw the line slanting slowly upward. 'He's coming up,' he said. 'Come on hand. Please come on.' The line rose slowly and steadily and then the surface of the ocean bulged ahead of the boat and the fish came out. He came out unendingly and water poured from his side. He was bright in the sun and his head and back were dark purple and in the sun the stripes on his sides showed wide and a light lavender. His sword was as long as a baseball bat and tapered like a rapier and he rose his full length from the water and then he re-entered it, smoothly, like a diver and the old man saw the great scythe-blade of his tail go under and the line commenced to race out. 'He is two feet longer than the skiff,' the old man said." -- Ernest Hemingway, *The Old Man and the Sea*, 1952, pp. 62-63.

"We began our Revolution from the sea. .... That is to say that our Revolution in its origins was related to the sea. ... We are developing a fishing fleet, and not based on little boats with 2 or 3 crew members, but boats which go out thousands and thousands of miles from the coast." -- Fidel Castro Ruz, Comandante en Jefe, August 3, 1963

"It was indispensable for Cuba to develop its fishing industry as a source of food. The agreement [to cooperate with Soviet Union] opened the doors to what is now the flourishing Cuban fishing industry. .... The 20 years of cooperation in fishing between the USSR and Cuba represent a brilliant example of brotherhood; both peoples have sunk their deepest roots in proletarian internationalism." -- Victor Schein, Soviet Fisheries Attache, November 5, 1982

"Of all the countries, if I was asked to name one that has set the best example of a State's intelligent involvement in its fishing industry, that one would be Cuba." -- Arthur Reynolds, Irish journalist, April 1985

"More longliners for our fleet: Destined for the already impressive Cuban Fishing Fleet, the well equipped longliners *Arenque, Rascasio, Medregal, Liseta, Anchoa, Alecrín, Róbalo,* y *Merluza* arrived at the Fatherland from Spain. Soon the *Cubera* and the *Jurel*, and other modern tuna boats, will also arrive. These vessels added to those we already possess will increase the well-deserved international prestige of our country. In fishery matters, reaffirming what has been stated, we will also triumph." *Mar y Pesca*, January, 1967

"It is true that the Cuban longline fleet was a big disappointment. We expected much more than the fleet actually delivered. We never achieved the yield anticipated. Another serious problem was that was never able to market our tuna catch in Japan for the high prices received by several other countries with longline fleets. This was primarily because our longliners were not equipped with the necessary refrigeration equipment to maintain the catch at ultra-low temperatures." Anonymous Cuban official, March 16, 2000

"A variety of factors explain the poor performance of the Cuban Tuna Fleet. In discussions with colleagues we often mentioned two particularly serious problems. One was that FAC officials were enamored with "desarrollismo"--an overwhelming commitment to development. The other was poor management practices, especially inflexible centralized control which we described as "dirigismo" or excessive centralized control. -- Andrés Rodríguez, former CIP researcher, September 16, 2001.

"In the general scheme of development we are [now] considering the development of the tuna fishery by pursuing the purseseine fishery, a technology much more productive than longlining. Our situation is that we did not make the investment in purseseining and we continue operating with longliners that although they are less productive, can be operated in international waters." -- Fisheries Minister Jorge Fernandez Cuervo, February 23, 1982

"The Japanese, Taiwan, Korean, Spanish, American, and other fishermen have all found tuna and swordfish longlining to be highly profitable. Even today with stocks depleted and all the restrictions, Taiwan fishermen are expanding operations from their Trinidad base. Why have all these fishermen been so successful and we with huge investments in foreign-built boats have achieved such unprofitable results? The amazing thing is that we could not even achieve profitability when the Soviet Union was virtually donating the fuel." -- Anonymous Cuban official, March 16, 2000

"The Cuban distant-water fleets, both FLOCUBA and FAC, have proven disasters. Castro was obsessed with the Soviet idea of operating large commercial fishing vessels on distant grounds. Officials ignored the advise of international consultants that the plans for a distant-water fleet was not viable. As a result, more than 50 large commercial fishing vessels were built in foreign shipyards. This required the expenditure of enormous amounts of hard currency, badly needed for potentially more productive projects. The vessels proved very expensive to operate and maintain and never reached the initial production goals. Many were built at the time when coastal countries were declaring 200-mile zones. By the time the vessels were delivered, most of the anticipated fishing grounds were closed off to them by coastal countries. Officials early on in the operations of the longline fleet concluded the fishery was unprofitable. The FLOCUBA vessels were mostly used to take low-value species. Only subsidized Soviet oil allowed operations to continue into the early 1990s. Overall FLOCUBA and FAC proved to be a case study in poor planning, mismanagement, and a tremendous waste of scarce national resources." -- José A. Suárez, June 3, 1994.

"The Cuban Government in 1996 decided to close the Flota Atunera de Cuba. The aging Japanese and Spanish commercial longliners that we had purchased were becoming very costly to maintain and because of our economic recession, we could afford to purchase new vessels. The commercial fleet was sold. Our traditional fishermen still do some longlining off the northern coast, landing about 300-400 tons of tuna and related species annually." -- Julio Baisre, Director of Fisheries Management, Ministerio de la Industria Pesquera, October 9, 2000

"As a result of Cuban socialist organization, the most valuable fishery in the country in the late 1980s and early 1990s was not, ironically, the product of the high-tech distant-water fleet that Castro had envisaged some 30 years previously. It was instead, small-scale, artisanal spiny-lobster fishery operating in the waters of the Cuban insular shelf." -- Ian Joyce, Douglas College (Canada), October 1997

"Our tuna fleet no longer exists and we now operate only a few highseas trawlers. As a result, large numbers of the fishermen we trained for distant-water operations no longer have jobs. What we are trying to do is find jobs for them, either through joint ventures or working aboard foreign vessels, both fishing and merchant vessels. Some of these vessels calling at Havana pick up new crew members here." -- Adolofo Puente, AGECREW, November 10, 2000

"The Cuban Ministerio de la Industria Pesquera (MIP) has made major changes in the fishing industry during the 1990s. Our fishery cooperatives have been replaced with producer associations. Instead of straight salaries they now receive financial incentives if they surpass their production quotas. We believe this is helping to reduce costs and to improve efficiency. MIP continues to own the fishing boats. The associations, however, are now responsible for fuel and maintenance as well as replacing older vessels." -- Anicia García Alvarez, Centro de Investigaciones de Economía Internacional, Universidad de la Habana, November 24, 2000

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7

CAYMAN ISLANDS

The Cayman Islands have only a small fishing industry harvesting demersal species on the limited shelf area around the islands and on neighboring banks in the western Caribbean. Catches by local fishermen total only about 100 tons and have changed little in recent years. The authors know of no longliners currently in operation or plans to acquire any. There is no local swordfish catch. There has been some limited shark fishing, but none is currently underway. The fishing industry in recent years has been eclipsed by the development of the tourist and financial services industries. British officials have advised that billfish and other sports species be reserved for a recreational fishery. The Caymans register foreign beneficially owned vessels, but in recent years have not registered such foreign commercial fishing vessels for highseas operations. Only two remain on the Cayman registry.

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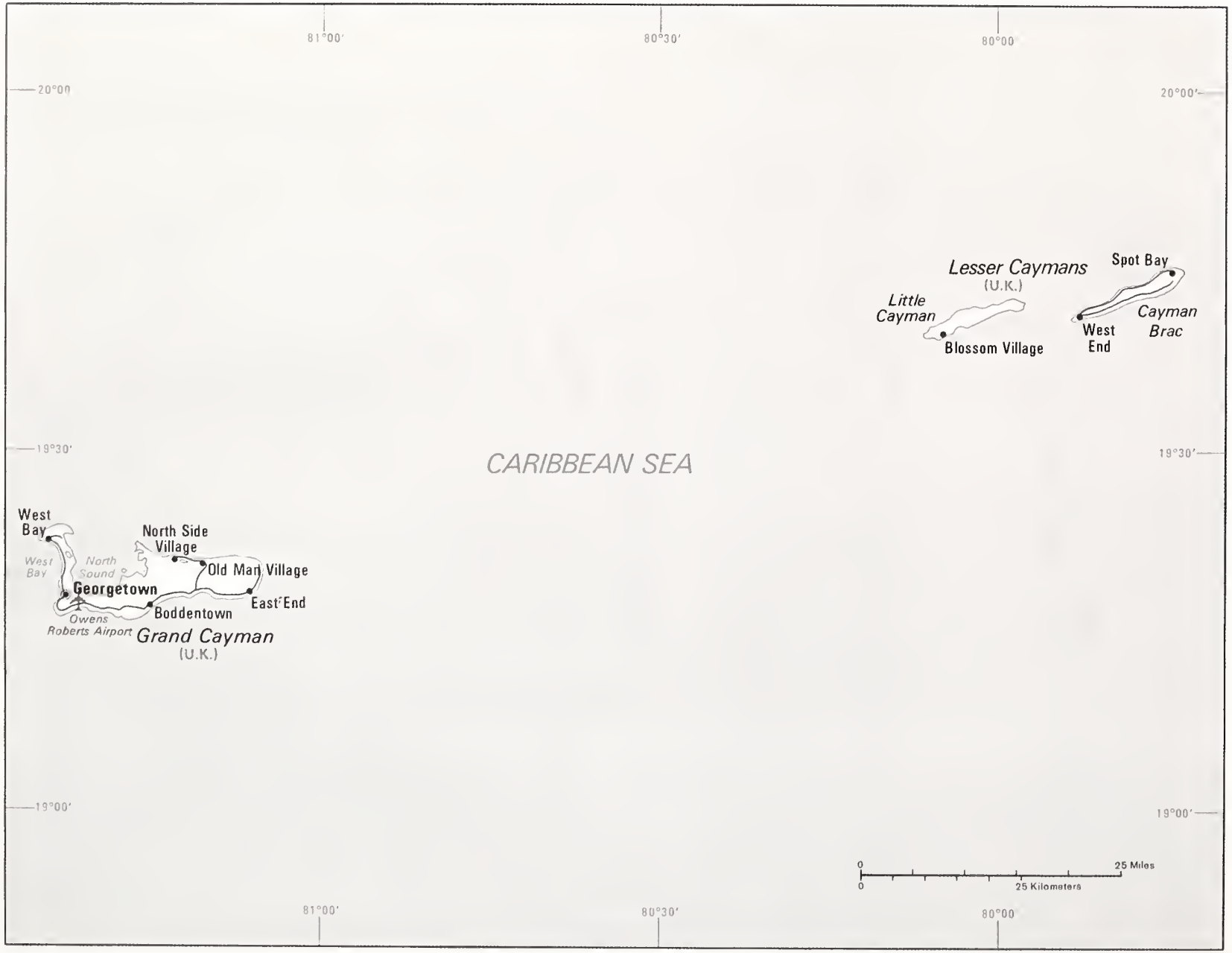

Figure 1.--Map of the Cayman Islands

I. Overview

A. Background

The Cayman Islands were discovered by Columbus in 1503, on his fourth and last voyage to the new world. Columbus was actually on his way from Panama to Hispaniola when his ships were blown off course by strong winds and he sighted Cayman Brac and Little Cayman. He reported sighting two small islands so full of tortoises (turtles) that they looked like rocks and he gave the islands the name Las Tortugas (The Turtles). Over the next 150 years the islands went through several name changes and played host to various visiting ships as sailors used the islands to replenish their supplies of fresh water, as well as stocking up on turtle meat and various wild fowls. One of the name changes, Caymanas, suggests crocodiles were once present. It was derived from the Carib word for members of the crocodile family. Several passing buccaneers, including Sir Francis Drake and William Dampier, noted "large lizards" and crocodiles on these islands during the 1500s to 1700s. Colonial records indicate English attempts to settle the islands in the 17th century. The Spanish in the 16th and 17th centuries, however, would attack such settlements in an effort to prevent the English from developing a foothold in the Caribbean.

The islands have a colorful seafaring history, and tales of buccaneering feats have reached near mythical status. Pirates in the 17th century frequently called at the Caymans. It is reported, for example, that notorious pirate Sir Henry Morgan, paid visits to these islands. Pirates sailed the Caribbean under permission from their countries and were know as privateers. Their mission was to plunder enemy ships. The English privateers were particularly active, hoping to take a Spanish treasure ship. Privateering officially came to an end with the Treaty of Utrecht (1713-1714). As a result of this treaty, France and Spain ceased hostilities towards other European countries, including Britain, and the islands are then reported to have become hideouts for these out-of-work pirates.

The Caymans came under British control when Jamaica was captured from the Spanish by Oliver Cromwell's army. They officially became a British territory when the Treaty of Madrid was signed in 1670 and Spain recognized the Caymans, along with Jamaica, as British possessions in the treaty of Madrid. The islands still retain much of the British heritage. Grand Cayman was not settled until 1734 and further settlements were made in 1833. The Cayman Islands was administered as part of the British colony of Jamaica.

The Caymans became a separate crown colony in 1959, although administered by the same Governor as appointed for Jamaica. After Jamaica achieved independence in 1962, a separate Administrator was appointed for the Caymans, who since 1972 has been a Governor. The legislature is the Legislative Assembly, most of whose members are popularly elected.

The Cayman Islands is composed of three islands, Grand Cayman, Little Cayman, and Cayman Brac. The largest island is Grand Cayman, comprising over 75 percent of the colony's total land area. The islands are located in the western Caribbean, south of Cuba and about 200 kilometers (km) northwest of Jamaica.

Cayman Islanders became known for their mastering of the seas as fishermen and turtlers. When turtle populations decline on the Cayman Islands because of over-exploitation, the Cayman Islanders began harvesting off Central America and Cuba. They established turtle harvesting villages on Cuba.[1] Some of the descendants of these turtlers, however, remained in Cuba and are still involved with turtles. In the early 1900s, because of limited job opportunities on the

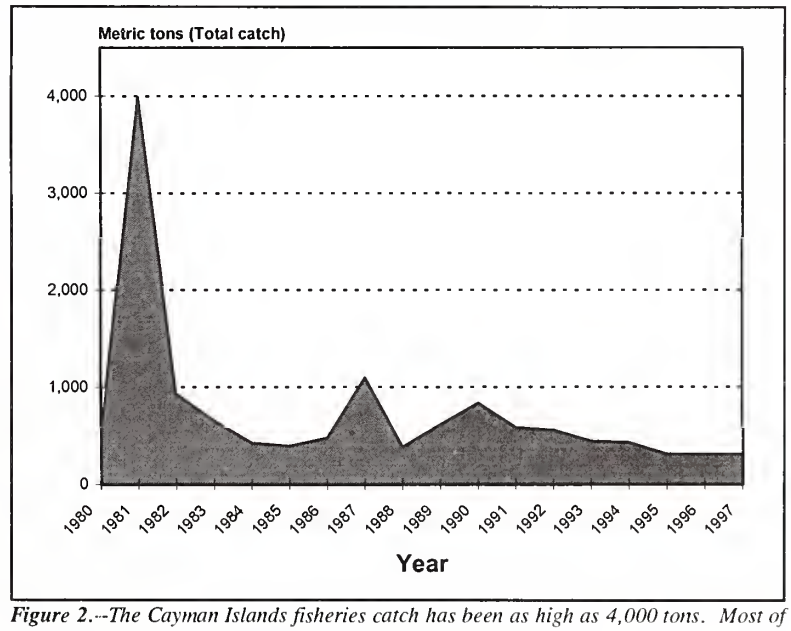

Figure 2.--The Cayman Islands fisheries catch has been as high as 4,000 tons. Most of the catch, however, was taken by flag-of-convenience vessels.

islands, many Caymanian men took to the seas as sailors aboard merchant ships which sailed the Caribbean, to North America and Central America. The tradition continued until well into the century and Cayman sailors served on the merchant ships of many countries. Many of these seamen became captains and chief engineers on ships. The tradition has since dwindled as more lucrative job opportunities can now be found on the island. As a result, the modern generation can be found closer to home.

The Cayman Islands have developed as a major international financial services center. This activity has become a key economic endeavor and contributor to the economy. Another important economic activity is tourism.

Financial services: The Caymans has no direct taxation which helps to promote a thriving offshore financial center. More than 40,000 companies were registered in the Cayman Islands as of 1997, including almost 600 banks and trust companies; banking assets exceed $500 billion. A stock exchange opened in 1997.

Tourism: The Cayman economy is based on tourism which accounts for about 70 percent of the gross national product (GDP) and 75 percent of foreign currency earnings. The number of tourists visiting the Caymans each year greatly exceeds the small local population. Total tourist arrivals exceeded 1.2 million visitors in 1997. The tourist industry is aimed at the luxury market and caters mainly to visitors from North America. Visitors come to enjoy the wall, wreck and reef diving, soak up the sun, venture upon the water fishing, or just relaxing to a slower Caribbean-style pace of life. The tourist center is around George Town on the populated West End of Grand Cayman. The East End of the island is more laid back, is less populated, and has fewer scuba diving operators and less-traveled wall and reef dives. Recreational fishing is one of the islands popular tourist attractions.

Fishing industry: The fishing industry is also of some importance, as it is one of the Cayman's few renewable natural resources and provides food on a island that has to import most of its food. About 90 percent of the islands' food and consumer goods must be imported.

B. Fishing industry

The Caymans have a very small fishing industry. The fishery is conducted by less than 50 part-time fishermen, according to one 1993 study. The Cayman's have much higher income levels than most other Caribbean Islands. The Islands have only a small population and the fishing industry now attracts little interest among young people because of the much more lucrative earnings available in the tourist or financial services industry.

The Islands' few fishermen conduct small coastal fisheries as well as limited offshore operations on various western Caribbean grounds. A small number of inshore fishermen deploy beach seines, traps, and hook and line. Seine nets must now be licensed and there are as of 2000 less than 30 license holders.[2] Lobsters are no longer taken with traps but rather by snorkeling. Offshore fishermen target snapper, grouper, and dorado. As much of the off-shore activity is on grounds claimed by other Caribbean countries (Colombia and Honduras), it seems unlikely that such activities can be significantly expanded. The Cayman's fishing zone offers minimal opportunities to foreign distant-water fishermen.

The Cayman Islands Government (CIG), like several other Caribbean countries (Barbados, Belize, Honduras, Panama, St. Vincent, and others) has registered foreign-owned fishing vessels under the Cayman flag as a revenue-generating activity. These flag-of-convenience registrations by 1989 had reached significant levels.[3] The Cayman registrations appear

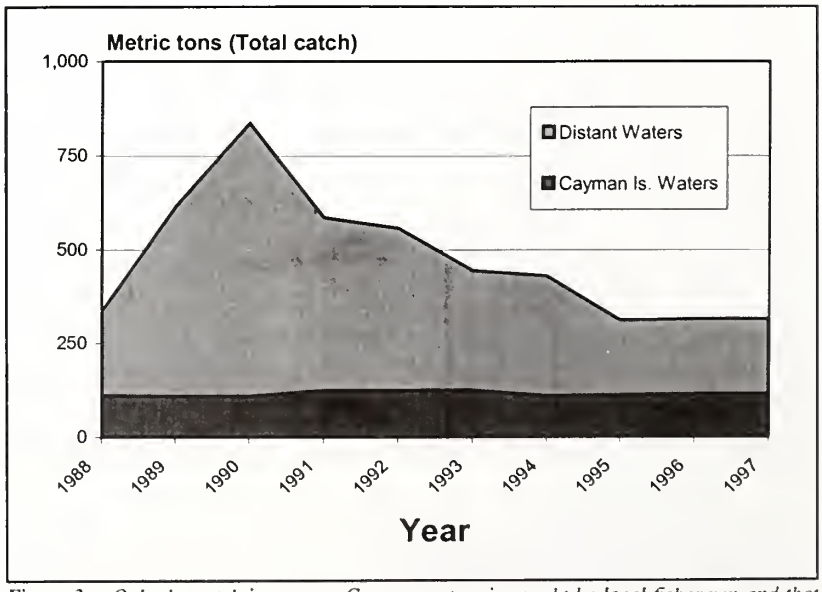

Figure 3.-- Only the catch in or near Cayman waters is caught by local fishermen and that catch has remained constant over the years.

to have been sought primarily by European and North American companies and not Asian countries as is the case of several Central American countries registering flag-of-convenience vessels. This is in part because Cayman regulations favored national and corporate bodies from British territories.[4] It is not fully understood while foreign owners choose Cayman registry.[5] CIG decided in 1989 to cease registering foreign-owned fishing vessels that operated outside of Cayman waters because of the difficulty of regulating such non-Cayman vessels. CIG has since removed many of the foreign-owned vessels from the Cayman registry.

The Cayman Islands has an extremely small fishing industry. The overall catch as reported by FAO approached nearly 4,000 metric tons (t) in 1981, but has since declined to less than 1,000 t after 1987 (appendix A). During the 1990s the catch has been 300-800 tons. Most of this catch, however, is taken by foreign-owned vessels which reported catches off West Africa (appendix A). Other vessels operated in the South Atlantic and other areas, but do not report their catch.[6] FAO in 1999 no longer reported the foreign catch. The catch harvested by Cayman fishermen for local consumption is only about 110-125 t annually and has changed little since 1987 (appendix A).

The Cayman's two most important resources (lobster and conch) have been overfished for many years and stocks have been depleted.[7] Exports of lobster and conch totaled over $12 million in 1990, but current shipments are limited. The CIG limits catches of these species in an effort to allow the resources to recover. Caymanian officials reports that in 2000 there were no exports from domestic fisheries.[8]

There is a strong demand for fishery products on the Caymans. The tourist industry is an important part of that demand. The Department of Tourism reports that more than 380,000 tourists visited the Caymans in 1997.[9] The small Cayman's catch can not fully supply domestic demand given the popularity of seafood with tourists. As a result, the Caymans are a net importer of finfish. The apparent quantity of imports, however, have declined in recent years.

Fishery products are not an important export commodity. Available trade statistics erroneously suggest that some of the Islands' most important export commodities are seafood products. This trade data is misleading.

Available FAO data: Available FAO trade data suggest substantial changes in trade patterns. The data, however, because of flag-of-convenience registrations and transhipments is misleading.

Exports: FAO reports that export shipments have generally declined during the 1980s. Shipments totaled nearly $14 million in 1990 (Caribbean Overview, appendix F1a). After 1994, however, apparent seafood exports declined sharply. Estimated shipments in 1998 were less than $5 million. In actuality the shipments involved are not Caymanian exports, but incorrectly identified transhipments by foreign fishermen through the Caymans. Shipments by foreign-owned flag-of-convenience vessels may also be involved.

Imports: Cayman seafood imports have also declined, from $3.1 million in 1994 to $0.6 million in 1998 (Caribbean Overview, appendix F1b). The authors find this decline surprising given the importance of tourists in overall Caymanian demand.

Cayman reports: Caymanian officials confirm that the domestic catch by Caymanian fishermen is not being exported.[10] Much of the reported Caymanian exports are actually fish and shellfish transhipped through the Caymans.[11]

Virtually all of the Cayman seafood exports, especially the lobster shipments, appear to be the catch of either foreign-owned vessels flagged in the Caymans or foreign-flag vessels transhipping their catch through the Caymans.[12] FAO reports a small crustacean fishery (Natantian decapods), but it is one of the fisheries conducted by foreign-owned vessels off West Africa (appendix A).

The United States is the primary market for Cayman shipments which has consisted mostly of lobster. Cayman fishermen do not, however, conduct a local lobster fishery.[13] No details are available on the countries transshipping through the Caymans. Some observers speculate that because lobster is the principal species involved that it may be Cuban-origin product, but Honduran and other non-Cuban sources appear to supply most of the transhipments. Honduran and other foreign vessels are known to call in the Caymans.

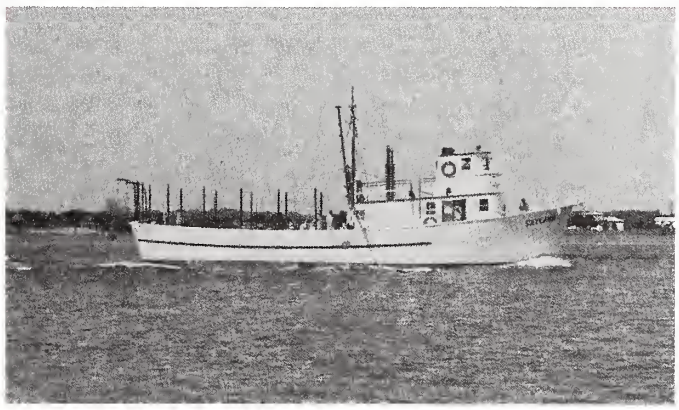

Photo 1.--Cayman fishermen used imported boats for lobster trap fishing, but the resource has been badly over exploited and traps are no longer permitted.

Some of these vessels have transhipped lobster in the Caymans.[14] U.S. imports in recent years have been very limited. Shipments in 1998 consisted of snapper and species like salmon and Patagonian toothfish not taken by local fishermen.[15] U.S. imports totaled only $186,000 in 1998 (mostly frozen fish); no shipments in 1999, and $7,000 (tilapia fillets) in 2000.

II. Species

The authors know of no studies describing swordfish off the Cayman Islands. Some limited data is available from foreign researchers or other sources from neighboring islands.

A. Spawning

The spawning grounds for swordfish are primarily deduced by the location and abundance of swordfish larvae. One 1983 study reported that there is relatively little spawning within the Caribbean itself, although some limited spawning does take place south of Cuba and around the Cayman Islands.[16] Cuban researchers have noted a concentration of swordfish larvae around the Caymans.[17] Considerable spawning activity is reported off western Cuba to the west of the Cayman Islands, both in the Yucatan and Florida straights. Most of the spawning appears to occur north of western Cuba in the Gulf of Mexico. Significant concentrations of small larvae have been found there. Notably this is an area from which larval swordfish can be transported by the Gulf Stream into the western Gulf and Mexico and north along the U.S. eastern coast to Cape Hatteras--the northern limit for significant concentrations of larval swordfish. The larger larvae found off Hatteras may well be from fish spawning off western Cuba. Larvae are present throughout the year in the western Caribbean and Gulf of Mexico, but most prevalent in the late fall and winter.[18] A more recent analysis shows a similar pattern of larval concentrations in the Gulf of Mexico and U.S. southeastern coast, but some more limited concentrations in the Yucatan and Florida Straits (Venezuela, figure 10).[19]

B. Stock assessment

The authors know of no evidence suggesting the existence around the Caymans of commercially important swordfish stocks. Foreign fishing, however, has substantiated that swordfish are present around the Caymans (appendix B). There is some evidence that yellowfin tuna may be available in limited quantities off the Caymans. A study commissioned by the Government concluded that the Caymans probably can not develop an important pelagic fishery in its own Exclusive Economic Zone (EEZ). The British study suggests that it would probably be prudent to reserve what ever oceanic pelagics that are present, like yellowfin tuna and billfish, for the sport fishery.[20]

Limited stock levels in the Caribbean itself probably reflects the generally low productivity of warm tropical waters, the lack of a major freshwater river system introducing nutrients, and other factors. This means that there are few sizeable stocks of fodder species supporting top oceanic predators like swordfish.[21] Some researchers believe that the southeastern Caribbean off the coast of Venezuela is a nursery area for swordfish.[22] This does not appear to be the case for the waters around the Caymans.

The generally small effort by foreign fishermen within the Caribbean is, in part, a reflection of the limited size of the available stocks. Longlining in the Caribbean is generally focused on the periphery around the island sills--especially at some of the passages connecting the Caribbean and Atlantic. The Venezuelans fish primarily in their coastal waters. U.S. fishermen generally focus on some of the passages between the Caribbean and Atlantic. Areas in the central Caribbean such as the Caymans are now rarely targeted by foreign longline fishermen (figure 4). Thus while the Caymans have a relatively large EEZ, swordfish and other large pelagic species do not appear to be present in quantities that would support a commercial fishery--although there is some potential for sport fishing.

C. Migrations

Very little information is available on swordfish migratory behavior around the Caymans. There has been only one swordfish tag return around the Caymans. One swordfish (HM017921) was tagged in the Gulf of Mexico and recovered between Cuba and the Caymans about 13 months later (Caribbean Overview, appendix C3). There is no way to definitively determine the route the fish took. It would be consistent, however with following the Gulf stream north and then entering the Caribbean either by returning south along the Gulf Stream or following the north Atlantic gyre. Some researchers believe that swordfish maturing in the theorized southeastern Caribbean (north of eastern Venezuela) nursery area may move westward through Cayman waters to the

Yucatan and Florida Straits to enter the Gulf Stream. There is, however, no tagging data at this time substantiating swordfish movement around the Caymans.

III. Fishing Grounds

A. Oceanography

The Cayman Islands (22°N, 80°W) are composed of three major islands. Little Cayman and Cayman Brac are about 200 km northeast of Jamaica and 190 km south of Cuba. Grand Cayman is located to the southwest of the two smaller islands, separated by 112 km of open sea. Grand Cayman is about 288 km from Jamaica and 240 km southwest of Cuba's Isle of Pines.

The Cayman Islands are surrounded by some of the deepest waters in the Caribbean. The Cayman Trench lies between the Cayman Islands and Jamaica. It is the deepest part of the Caribbean Sea, being over 6 km deep. South, towards the Gulf of Honduras, is the Barlett Deep. These deep areas of the Caribbean are in close proximity to the three Cayman islands. This, combined with the fact that Grand Cayman and Little Cayman are almost surrounded by living coral reefs, provide the Cayman Islands with some of the most diverse dive sites in the world. There are strong offshore currents that circulate around the islands.

B. Topography

The Cayman Islands are some of the smallest and most isolated Caribbean Islands. Grand Cayman, Cayman Brac, and Little Cayman are situated on emerging projections of the Cayman Ridge, which is a southerly underwater continuation of Cuba's Sierra Maestra mountain range in southeastern Cuba to the Misteriosa Bank in the direction of Belize. The main islands are essentially three cut-off "submarine mountain tops". The actual shelf area is minimal. Grand Cayman lies between Cuba and the Yucatan Peninsula of Mexico--jutting less than 20 m above sea level at it's highest point. The island is about 30 km long and between 6 and 11 km wide.

The total area of the three main Cayman islands is about 100 square miles. Grand Cayman is about 76 square miles, Cayman Brac 14 square miles, and Little Cayman 10 square miles.

Grand Cayman: Grand Cayman as the name suggests is the largest island. It is approximately 35 km long and 13 km wide at the broadest point. The highest elevation is about 18 m above sea level. Grand Cayman's most striking topographical feature is the North Sound, a shallow, reef-protected lagoon with an area of about 35 square miles.

Cayman Brac: Cayman Brac lies about 145 km east northeast of Grand Cayman. The Brac is about 19 km long and only about 2 km wide. The Bluff is the most outstanding natural feature, rising along the length of the island and reaching a height of over 40 m at the eastern end before falling in a shear cliff to the sea.

Little Cayman: Little Cayman is 8 km west of Cayman Brac and is 16 km long and 3 km at its widest point. It is the most low lying of the three main islands. Its highest elevation is only 12 meters. To the west, an 11-km channel separates Cayman Brac from Little Cayman.

Small low lying islands like the Caymans are especially suspectable to hurricanes. Perhaps the most dramatic event in the history of the Cayman Islands was the devastating hurricane that occurred in 1932 before satellite imaging provided early warning of such storms. The Hurricane hit Grand Cayman on November 7 with winds estimated at 150 mph and an initial storm surge over 9 meters. The storm passed over Cayman Brac a day later with winds of an incredible 200 mph and a surge of nearly 10 meters. The islands were completely devastated, especially Cayman Brac where 69 lives were lost. Many homes and most boats were washed out to sea. Some people escaped death by climbing trees to escape the water. Stories abound of heroic rescues. It took many years for the islands to recover and many of the older residents can still vividly remember the tragic storm.

The Caymans are notable for the extensive area of turtle grass in the sounds surrounding Grand Cayman, Cayman Brac, and Little Cayman. About 60 percent of the 80 square kilometers of North Sound is covered with turtle grass (*Thalassia testudinum*) and interspersed with green algae of the genera *Halimeda*, *Penicillus*, and *Rhipocephalus* as well as an abundant population of bivalve mollusks on which some turtles feed. Another turtle prey item is jellyfish, especially *Aurelia* and *Cassiopeia*, which are often associated with these turtle grass beds. While North Sound has the largest area, turtle grass beds are also found at South Sound and Frank Sound (Grand Cayman) and South Hole Sound (Little Cayman). Turtle grass beds are less common off Cayman Brac, but some can be found along the south coast.[23]

C. Fishing areas

1. Cayman-flag vessels

a. Domestic vessels

The Cayman Islands 200-mile Exclusive Economic Zone (EEZ) totals about 122,000 square kilometers. This is a substantial area of the western Caribbean south of Cuba. The Cayman EEZ is bounded by Honduras to the southwest and Jamaica to the southeast. It is one of the largest Caribbean zones, especially when measured as a ratio with land area or population. Despite the size of the Cayman EEZ, there are few productive fishing grounds located within it. Cayman Bank, a 8 km by 1 km area some 15 km west of Grand Cayman, has depths of 15 m to 320 meters. The Caymans have virtually no continental shelf area. One estimate reports only 255 square km of shelf for over 200 km of coast.[24] This severely limits populations of demersal species.

Cayman Islands fishermen do not conduct distant-water operations, but do operate in various areas of the western Caribbean. Some fishermen may be employed on the foreign-owned flag-of-convenience vessels deployed on distant-water grounds, especially grounds off West Africa.

b. Flag-of-convenience vessels

The Caymans has extensive experience with foreign-flagged vessels. Cayman Islanders have for years sought employment on foreign merchant ships. The wages earned have resulted in income levels above those of the other small Caribbean islands, even before the growth of a vibrant tourist and financial services industry. Most of the individuals involved in merchant navy careers appear to have maintain family ties to the Caymans and return to the Islands after completing their merchant careers.[25] With the expansion of the Cayman economy in recent years, few Cayman Islanders now pursue careers on foreign merchant vessels.

Little information is available on the distant-water operations of the foreign-owned vessels registered in the Caymans. The flag-of-convenience fleet could have totaled as many as 50 medium and large fishing vessels totaling 30,000 GRT.[26] Given the size of the Cayman flag-of-convenience fleet, the catch may have totaled 90,000 t annually.[27] Cayman officials are reportedly no longer registering flag-of-convenience and have removed several previously registered foreign-owned fishing vessels from the Cayman registry. Foreign registrations in 1993 amounted to 15 vessels totaling about 14,000 GRT.[28] This has significantly reduced the fishing potential of the foreign-owned vessels. The foreign vessels in the mid-1990s still had the capability to catch about 45,000 t of fish and shellfish annually.[29] The foreign vessels are known to have conducted operations in the North Atlantic, South Atlantic, and off West Africa.[30] As of early 2000, CIG officials had reduced the flag-of-convenience registrations of fishing vessels to only two boats.

2. Foreign vessels

Foreign fishermen have not been active off the Caymans, but Japanese fishing during the 1960s-70s demonstrates that swordfish are present. The Japanese have been the foreign country most active off the Caymans. (See: "XVI. International".)

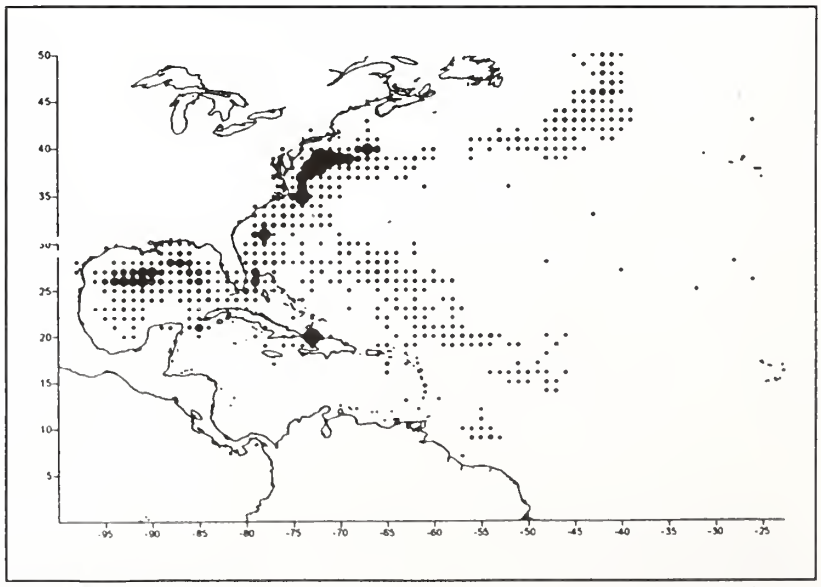

Figure 4.--U.S. longline fisherman rarely set around the Cayman Islands, although in some years there is considerable activity in the windward passage between Cuba and Haiti.

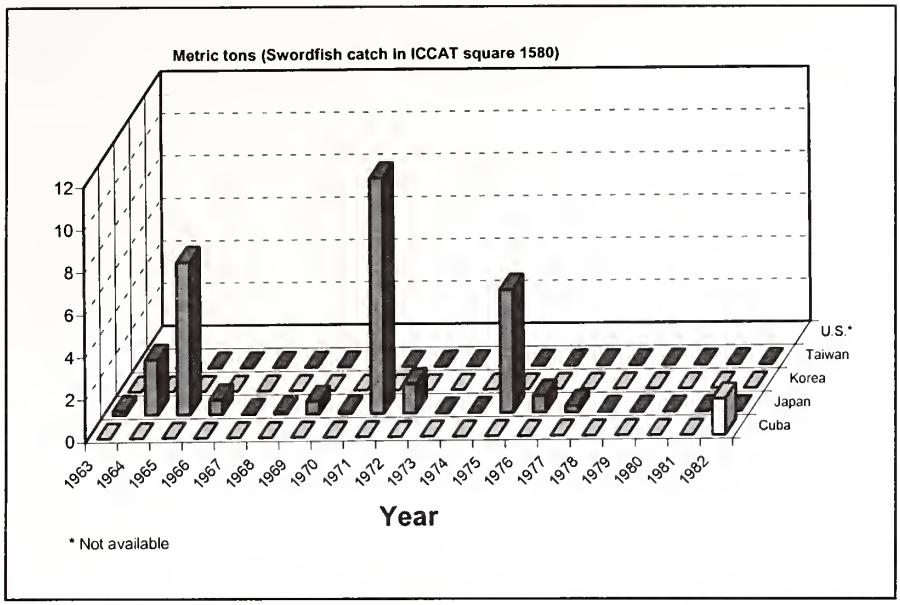

Figure 5.--The major distant-water country fishing around the Caymans has been Japan, primarily during the 1960s and 70s.

IV. Fleet

A. Domestic vessels

1. Artisanal

One now dated report indicated that in 1979 the local artisanal fleet consisted of about 40 boats, averaging about 6-8 meters (m) and generally equipped with outboard motors. Many are only operated on a part-time basis.[31] A 1988 study reported that the offshore fleet consisted of 10 vessels averaging about 15 m which landed about 250 t of fish annually.[32]

2. Commercial

There are no current Cayman shipyards building commercial fishing boats.[33] Cayman fishermen have imported a few larger vessels for commercial operations, mostly from U.S. shipyards. Cayman Seafood Suppliers in George Town (Grand Cayman), for example, purchased the *Cayland*, a 22 m boat from a U.S. shipyard (Diesel Shipbuilding) in 1976 to be used in catch and transporting lobster.[34] A series of 21-31 m trawlers, the *Starfish I-VII*, were imported from the United states (Desco Marine) in 1979.[35]

3. Recreational

The Caymans has an important recreational fleet. A 1993 British report indicated about 70 boats were active in the recreational fishery.[36] About 25 companies offer charter boats for the tourist industry.[37] A typical company is Black Princess Charters which offers an 11.5 m boat, the *Black Princess*, for both deep-sea and reef fishing as well as diving expeditions. The pelagic species taken are wahoo, tuna, dorado, and marlin.[38]

B. Flag-of-convenience vessels

The Cayman Islands has no high-seas fleet, although some Cayman fishermen do operate in an offshore fishery on various banks and cays in the western Caribbean. The Caymans Islands Government (CIG) in 1974, began registering foreign beneficially owned vessels.[39] Some of thee vessels were fishing boats operated in distant-water fisheries. CIG modified its registration policy in 1989 and no longer issues flag-of-convenience registrations to foreign-owned fishing vessels.

1. Flag-of-Convenience Registrations

Cayman authorities began registering flag-of-convenience vessels in the early 1970s. This activity provided an important source of income for the CIG.[40] Most of the foreign vessels registered in the Caymans are merchant vessels, but small numbers of foreign-owned fishing vessels were also on the register. It is unclear why the foreign fishing vessel owners selected the Caymans. It may be because the Caymans had been registering foreign-owned vessels for several years and had established a reputation for accepting such registrations. The Caymans' off-shore banking center and strong bank secrecy laws and its stability as a British Crown colony may be other important factors.

All the larger fishing vessels still registered in the Caymans appear to be flag-of-convenience registrations. Unlike many countries issuing such registrations, however, Cayman law requires that the companies operating these vessels must have Cayman equity participation. Cayman officials point out that

"Shares have to be issued."[41] The owners have registered their fishing vessels in the Caymans for a wide range of quite legitimate reasons.[42] Some of the owners, however, have obtained flag-of-convenience registrations because it allowed them to evade various international fishery management regimes in which the Caymans does not participate. It also allowed the foreign owners to evade a variety of strict fishery management, pollution, environmental safety, tax, or other regulations which are enforced by their own governments. U.S. beneficially owned tuna seiners, for example, were registered in the Caymans during the 1980s, reportedly to avoid U.S. dolphin protection laws.[43] Some information is available on the foreign fishing vessels on the Cayman registry.[44] The vessels were registered by beneficial owners in Canada, the European Union, South Africa and the United States.[45] One of the last such venture was the purchase of three derelict seiners that were registered in the Congo and then refitted in Spanish shipyards.[46] Unlike some of the other Caribbean countries, the Caymans registered few Asian longliners.

2. New Registration Policy

The Cayman Islands Government (CIG) in 1989 restricted future registrations of commercial fishing vessels to those beneficially owned by Caymanian nationals for use only within the Cayman EEZ. The CIG no longer registers foreign-owned vessels with no legitimate Cayman's connection that are to be deployed on distant-water grounds. CIG has removed many of the non-local fishing vessels from its vessel registry.

The CIG decided to cease making fishing vessel registrations because of the impracticality of regulating non-domestic fishing vessels. CIG is currently systematically conducting safety surveys on the remaining vessels for compliance with the requirements of the 1977 Torremolinos Convention as interpreted by the United Kingdom. Those owners who fail to offer their vessels for survey under this regime will also be removed from the Cayman register. These measures have sharply reduced the flag-of-convenience fishing vessels flying the Cayman flag. [47]

CIG officials reported that in 1993, only 15 foreign-owned vessels totaling less than 14,000 GRT were on the registry.[48] Officials report as of October 2000, only two internationally operated commercial with a total tonnage of 539 GRT remained on the Cayman register.[49] Details on the operations of these vessels are not available, but they are believed to be operated around South Africa.[50]

V. Shipyards

The Caymans used to build wooden vessels using the native mahogany trees. This industry closed, however, with the native forests were logged out. The authors know of no current Cayman shipyards building commercial fishing vessels. Most commercial and recreational vessels used in the local fishery appear to have been imported from U.S. shipyards.[51]

VI. Fleet Operations and Gear

A. Artisanal fleet

The Caymans has little organized local fisheries. Until the development of the tourist industry, much of Cayman fisheries was conducted on a subsistence basis, with many working only part-time. Much of the local fishing is still conducted by part-time fishermen.[52] Most full-time fishermen have turned to more lucrative paying jobs such as construction which have been created by the growing banking and tourist sectors.

Cayman fishermen participate in both an inshore and offshore fishery.[53] A small number of local residents (about 50) participate in these fisheries.
Inshore fishery: The inshore fishery is of only limited importance to the Cayman economy. Local banks report very few requests by fishermen for development loans. The principal species targeted are groupers, snappers, jacks, barracuda, and parrotfish. Much of the fishing is apparently conducted by hand lining. Artisanal catches total about 3-5 t per year.[54]
Offshore fishery: The offshore fishery has fluctuated from 10 vessels (12-15 meters) in 1988 to 8-10 vessels (9-13 m) in 1990.[55] Cayman fishermen in 1992 operated about 10 vessels (10 m). Most of the catch is taken on Misteriosa Bank (240 kilometers west southwest of Grand Cayman and claimed by Honduras) and Baja Nuevo (420 km south southeast in Colombian waters). Cayman fishermen also report occasional catches at Honey Hill, (195 km south of Grand Cayman) and Pickle Bank (82 km north of Little Cayman). The catch is primarily composed of blackfin

snapper, silk snapper, queen snapper, and wenchman, along with rainbow runner, dolphin, and groupers. The authors have no catch data on the offshore fishery. It seems unlikely, however, that Cayman fishermen could significantly expand this fishery. Most of it is conducted on grounds claimed by other countries (especially Colombia and Honduras). These countries appear to be tolerating the current level of activity, but could be expected to take some enforcement action if Cayman fishermen significantly expanded their fishing effort.

B. Recreational fleet

Recreational fishing is an valuable component of the important Cayman tourist industry. A British study suggested that the thriving recreational fishery more than makes up for the lack of a significant fishery for large pelagics.[56] The economic development of the Caymans in recent years has attracted increasing numbers of recreational boats.[57] In addition, rising domestic income levels has meant that increasing numbers of Caymanians can afford recreational boats.

The most important activity of the Caymans charter boats is diving expeditions rather than actual fishing. The Caymans offers spectacular areas for divers to observe marine life in crystal clear waters. One of the most popular areas is Sting Ray City where divers can hand feed rays.

Blue marlin is the primary target species of the sports fishermen. One observer reported that the principal big game fish targeted is sailfish.[58] Caymanian officials assure the authors, however, that it has always been blue marlin that has been the primary game fish that sport fishermen have targeted. Sailfish are generally considered an incidental, and unpredictable, catch around the Caymans.[59]

Several recreational fishing tournaments are held. One important tournament was the Million Dollar Fish Tournament, which was formerly held in June. Officials report, however, that Million Dollar Month no longer is held.[60] The most important tournament is the Cayman Islands International Fishing Tournament (CIIFT) held on Grand Cayman. The 1999 tournament attracted 69 boats during April 25-May 2, 1999. The 1999 CIIFT tournament took 31 blue marlins, all of which were released. Quite a number of tunas were also taken, including a 32 kg yellowfin. One unlucky angler caught a 243 kg marlin a week before the tournament. It would have been the prize fish if caught during the tournament.[61] The CIIFT is now the biggest tournament held on the Caymans and occurs on all three islands. The grand price for breaking the blue marlin record is $250,000. followed by $50,000 for wahoo, dorado (dolphin), or yellowfin tuna.[62]

Some observers believe that Caymans have done a better job in marketing their recreational fishery than some other Caribbean islands. The Caymans currently has a $1 million lottery for the visitor who catches a 600 lb (272 kg) marlin.[63]

C. Internationally operated fleet

The authors have little information on the operations of the internationally operated (flag-of-convenience) fishing vessels. The vessels do not appear to call at George Town.[64] The number of these vessels have been substantially reduced in the 1990s.[65]

VII. Catch

The authors have no information indicating that Cayman fishermen are catching swordfish.

VIII. Ports

The principal Cayman town and port is George Town on Grand Cayman. Cruise ships call at George Town harbor. It is the island capital and located on the developed west end of the island. The largest recreational fishing marina is located in George Town, but several exist at various locations around the island. In many cases they are situated close to particularly interesting diving sites.[66] Until 1990 there was no facility for larger recreational vessels. The Yacht Club in 1990 installed a floating dock and further improvements are contemplated.[67]

IX. Transshipments

Some of the foreign-owned flag-of-convenience vessels have transhipped their catch under the Cayman flag. These transshipments, however, do not appear to be physically accomplished through the Cayman Islands. Flag-of- convenience trawlers operating in the South Atlantic are, for example, shipping their catch to France under the Cayman flag.[68] Cayman officials are not aware of any transshipping activities by the few remaining Cayman-flag fishing vessels operating in international waters.[69]

Some fishermen with foreign flags have transshipped fish and shellfish through the Caymans. Some observers in the 1980s charged that Cuban lobster was being transhipped through the Caymans so that its origin could be hidden and the product could be marketed in the United States. British officials have, however, assured U.S. officials that the lobster in question was of Honduran origin or taken by U.S.-flagged vessels fishing in the western Caribbean.[70]

The authors know of no confirmed swordfish transhipments. The authors do not know, however, the source of the swordfish and marlin imports reported by Japan from the Cayman Islands during 1987-91 (appendix C3a). As the authors know of no Cayman longliners, this was presumably transhipped product or fish taken by flag-of-convenience vessels.

X. Processing and products

There are no important seafood processing companies on the Caymans.[71] No swordfish is known to be processed on the Caymans. The Japanese reported, however, importing small quantities of fillets from the Caymans during 1990-91 (appendix C3b). It is possible this was transhipped product or fish taken by flag-of-convenience vessels and not fish processed on the Caymans.

XI. Companies

The authors have virtually no information on Cayman Island companies or cooperatives involved in the fishing industry:

Bob Soto's Dive Company: This is the largest charter boat operator on the Caymans. Diving is an important tourist attraction on the Caymans.

Cayman Islands Fishermen's Cooperative Society (CIFCS): CIFCS submitted a $0.6 million project proposal to CIG in 1978. The fishermen planned to purchase two 18-21 m fiberglass boats and deploy them for troll fishing at sea and longlines for shelf-edge fishing. The fishermen were reportedly seeking financing from the Caribbean Development Bank (CDB).[72]

Harts Water Ltd.: This Georgetown company in 1997 bought three derelict tuna seiners (*Anzika*, *Manicongo*, and *Loango*) that had been built in Italy for a Congo fishing company. The vessels have been renamed (*Xiclli*, *Errosape*, and *Demiku*). The vessels are being refitted in Spanish shipyards.[73]

The Cayman Islands Seafarers' Association is involved in several marine projects. They work in a variety of marine sectors. A major effort was underway in 2000 to plan, for example, a catboat regatta. They are also preparing a historical report on the Cayman Islands turtle fishery.[74]

XII. Markets

A. Domestic

The Cayman's small population provides only a minimal market for seafood. The development of an important tourist industry has significantly expanded the local market. Much of the local catch is purchased by tourist hotels and restaurants and it is often difficult for individuals to purchase fresh fish.[75] Hotels and restaurants make small purchases of swordfish, but it is seldom seen on local menus and then only as a special.[76] The rapidly developing economy during the 1980s has significantly changed buying habits and much of the food purchased in the Caymans is now sold in supermarkets. Few of the supermarkets, however, have fresh fish counters. Some offer mostly imported, frozen fish. Imported swordfish and other oceanic pelagics are often available in the supermarkets and grocery stores, but the quantity involved is small because of the Islands' relatively population.[77]

B. Trade

1. Exports

Caymanian officials report that the domestic fisheries catch in recent years has gone almost exclusively toward supplying the domestic market. Officials report that in 2000 there was no exports from domestic fisheries.[78] In terms of value, most of the reported Cayman exports are crustaceans, largely lobster. Most of this, as mentioned above, is transshipments.

The Cayman Islands have reported only small, occasional swordfish exports. These shipments may actually be transshipments by foreign fishermen. The Caymans have reported some swordfish and other billfish exports during the late 1980s to Japan. The last such shipments were reported in 1991 (appendix C3a). No swordfish shipments were reported to the United States during the 1990s (appendix C2a).

European Union: The Caymans does not export swordfish to the EU (appendix C1).

Japan: The Caymans shipped billfish to Japan during the late 1980s and early 90s with shipments peaking at about 65 t annually during 1988-89 (appendix C3a). Exports declined in 1990 and 1991, the last year in which shipments were reported. At the peak of these shipments in 1988-89, swordfish probably constituted over 20 of billfish shipments. The authors are unsure, however, as to the source of these shipments. There was apparently no Caymanian domestic fishery that could account for such shipments. Transshipments by foreign fishermen or shipments from flag-of-convenience vessels are other possibilities. The only distant-water country known to fish extensively in the immediate area was Japan, but not during the years in question (appendix B).

United States: The Caymans do not export swordfish to the United States. The only known shipment was a small quantity in 1984 (appendix C2a).

2. Imports

The Cayman Islands have to import seafood to meet the substantial demand created by the tourist industry. Usually about half of these shipments are frozen crustaceans, much of which is supplied to hotels and restaurants for the tourist trade. Import shipments in recent years have reportedly declined (caribbean Overview, appendix F1a). There are no known swordfish imports, although tourist hotels and restaurants may make small purchases as the species is popular with American tourists.

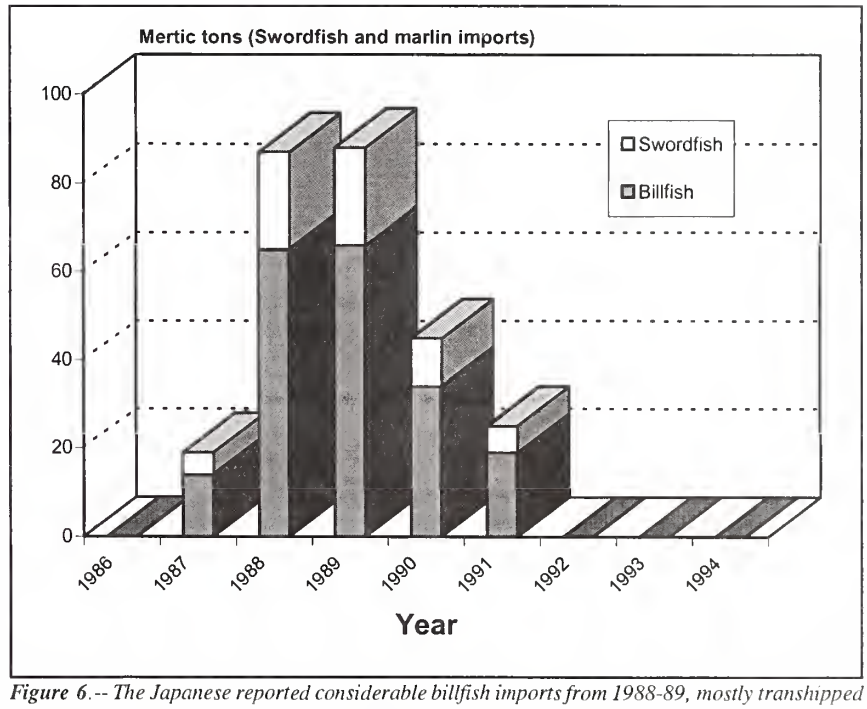

Figure 6.-- The Japanese reported considerable billfish imports from 1988-89, mostly transhipped product. The authors believe that a substantial, but unknown, amount was swordfish.

XIII. Government Policy

The agency responsible for Cayman fisheries is the Department of the Environment (DoE). There is also an autonomous National Trust which is chartered to protect the Islands' natural environment, including marine environment.

A. Fisheries legislation

The basic Cayman fisheries legislation are Proclamation No. 5 of 1977 and the Marine Conservation Act of 1978. CIG in the early 1980s was studying the possibility of updating domestic fishing regulations.[79] General fisheries legislation in the Cayman's is lacking, in part because of the extremely small domestic fishing industry. British advisors have suggested that Cayman authorities bring domestic fisheries legislation up to the harmonized standards that are being promoted regionally.[80]

The Caymans have no formal fisheries management plans. Given the small size of the domestic fishing industry, none may be necessary. Fisheries policy, according to a British study, "...revolves around the benign use of fishery resources for the tourist industry." The DoE has submitted recommendations to the Cayman Island Government for updating the marine Conservation Law. The DoE recommendations include: reducing the catch limits for queen conch and spiny lobster as well as regulating the use of fish traps. Some concerned citizens also feel that legislation is needed to limit the size, number, and species of reeffish that can be harvested.[81]

B. Limits

The British had previously declared a 200-mile Fishing Zone in 1977.[82] They subsequently declared a 12-mile Territorial Sea for the Caymans in 1990.[83] The British 200-mile fishing claim creates a substantial Caymans zone in the western Caribbean bounded by Honduras, Jamaica, and Cuba. The Caymans zone significantly limits the extension of the Cuban EEZ southward into the Caribbean.

C. Licenses

Cayman law authorized the issuances of fishing licenses to foreign fishermen.[84] The license can cover periods of up to 12 months. The Cayman Islands Government in 1988 was reportedly studying possible licensing arrangements for foreign fishermen.[85]

No information is available on foreign fishing off the Caymans. Some foreign fishermen have reportedly expressed an interest in pelagic fisheries. GIG officials are not encouraging such applications, however, believing that both inshore and offshore stocks should be reserved for the growing recreational fishing industry which is important to the tourist trade and local fishermen. The Government is reportedly considering the designation of exclusive offshore sports fishing areas where commercial fishing for large pelagics would be banned.[86]

The Caymans as of 2000 required no licenses for recreational fishermen.[87] A vessel registration system was introduced in the early 1990s, but a British consultant termed it "incomplete".[88]

D. Promotion

The Cayman Government has promoted the fishing industry through marina construction and the management of inlets. This has primarily benefitted the tourist industry and recreational fishery. These facilities provide safe havens for vessels and has attracted recreational and pleasure craft throughout the western Caribbean.[89]

E. Marine parks

The Cayman Islands has designated marine parks. These parks are an important attraction for the tourist industry.

XIV. Research

The DoE has a modest fisheries research capability. No other local marine research institute exists. Although the DoE is a small agency, it has received international exposure for its ongoing age and growth studies on local stocks of the Nassau grouper.[90] The MoE has also participated in a collaborative research project yielding the first known captive spawning of the Nassau grouper.[91] Other ongoing research projects include studies of spiny lobster and queen conch. The DoE has no present plans to initiate studies on pelagic species.[92]

The Government-owned turtle farm carries out research connected with the captive breeding and partial release of turtles.[93] British advisors have suggested that Cayman authorities give some attention to promoting cooperative research with the industry. Of particular importance is collecting data from sport fishermen to add to available data on billfish and other recreational species taken in the Caribbean.[94]

The Caymans Government is not currently contracting foreign groups to conduct research studies, but has done so in the past. In addition, some foreign researchers have expressed an interest in Caribbean research from the Caymans. The focus has been on demersal resources. The authors know of no foreign research on swordfish and other oceanic pelagics.

Florida Institute of Technology (FIT): The FIT has conducted natural resource surveys of the marine environment to establish baseline data to quantify commercial fisheries and identify fisheries development potential and to help site a proposed marine park.[95]

Harbor Branch: Researchers at the U.S. Harbor Branch Oceanographic Institute have done some work on demersal resources, the Nassau grouper near Grand Cayman.[96]

Integra Cay: An American citizen attempted to establish a non-profit conservation center in the Caymans in cooperation with the National Trust. The Center would have provided facilities for conservation workers and researchers studying terrestrial and marine species.[97] The project, however, did not materialize.[98]

University of Miami: Researchers from the University of Miami School for Fields Studies has worked with the DoE on demersal species. The research team prepared a marine community map of the Caicos Bank. Communities were grouped using a benthic community classification system.[99]

XV. Bycatch

As there is no swordfish fishery off the Caymans, there is no resulting bycatch. Some idea of Caribbean bycatch trends are available by assessing the data reported by the U.S. longline fleet in its Caribbean operations (Puerto Rico, appendices G1a-b).[100] As the U.S. fleet reports minimal activity around the Caymans, this data, however, may not be as relevant to potential operations around the islands as it is to islands in the eastern Caribbean sail. Many of the species most commonly reported in the swordfish longline bycatch are not significantly targeted by Cayman fishermen, although most are present in Cayman waters.

A. Tuna

The authors have no data on Cayman tuna catches. Local fishermen primarily focus on demersal species rather than pelagics like tuna.

B. Billfish

Recreational fishermen target billfish, especially blue marlin. The authors know of no available data on billfish catches. Some observers believe the best opportunity for Cayman fishermen may be recreational fisheries for billfish.

C. Sharks

Local fishermen several years ago attempted some shark fisheries, although the authors have few details.[101] Cayman officials report that the fishery was never a large one and no shark fishing is currently being conducted by Cayman fishermen.[102]

D. Turtles

The Caymans once supported a very large sea turtle population. Columbus, in fact, on discovering the islands, named them "Las Tortugas" or the Turtle Islands. The primary Cayman turtle species is the green turtle, although hawksbills, loggerheads and leatherbacks are also reported. The Cayman Islands have supported a huge sea turtle rookery. Over 25 percent of the combined coastline is sandy beaches, providing large expanses for nesting. Large areas of beach on Grand Cayman and Little Cayman are idea for green and leatherback nesting. Smaller areas on Cayman Brac would be suitable for hawksbill and loggerhead nesting. There are important areas of turtle grass where some species could forage. The strong

offshore currents and the limited shelf area, however, support historical accounts of large nesting populations rather than foraging populations. The green sea turtle apparently was the primary turtle on the Cayman Islands rookery and most references indicated that the turtles were abundant during the summer months.[103] This corresponds to the now known mating and nesting season for Caribbean turtles. The currents would help disperse the hatchlings.[104]

The Cayman Islands in the 16th and 17th centuries were used as a provisioning stop by ships to furnish a supply of meat for sailing vessels. The considerable length of voyages and lack of modern preservation techniques made local provisioning necessary. The huge Caymans rookery was, by the beginning of the 19th century, wiped out. Turtle nesting on the Caymans continues to be minimal. While turtles are now protected, beach development and tourist activity may present serious obstacles to turtle nesting.[105]

The traditional turtling industry of the Cayman Islands has since the destruction of the Cayman rookery been based on a fishing fleet sailing from the Cayman Islands to catch turtles elsewhere in the Caribbean. Cayman turtlers began sailing to Cuba, Nicaragua, and Honduras to take turtles. They first targeted Cuban waters in the 19th century, when the banks and shoals near Nicaragua, Honduras, and Costa Rica became the primary fishing grounds. These fishermen established English-speaking villages in Cuba to harvest turtles. Descendants from these turtlers still catch turtles in Cuba today.[106]

The green sea turtles, traditionally fished by turtlers from Grand Cayman, were exported to the United States and Jamaica for meat and soup products. The hawksbill turtles, traditionally fished by turtlers from Cayman Brac, were processed and the shell exported while the meat was consumed locally.[107] Because of overfishing and habitat destruction, most populations of all sea turtle species are endangered or threatened. As a result of the decline in sea turtle populations, international regulations have been implemented to eliminate the trade in wild sea turtles.

Cayman Islands legislation now controls the take of sea turtles and regulates the number, species, size and season for turtling by traditional methods for local consumption only.[108]

The Mariculture enterprise on the Caymans operates a turtle farm on Grand Cayman. It was set up in 1968 as a private company to rear turtles. The United States banned the importation of turtle products in 1978, thus closing the principal market. The turtle farm was subsequently purchased by the CIG. One report in the early 1970s indicates that approximately 40,000 green turtles of various ages were kept in two areas in concrete and fiberglass tanks. A system of circulated seawater was installed. The farms were stocked with eggs collected from beaches at Ascension Island, Suriname, and French Guiana. Planners hoped to eventually produce their own eggs. Gravid females have laid eggs on artificial beaches and turtles have mated in the farm's ponds, but there is no evidence that released juveniles have returned to the Caymans to nest.[109] The farm does appear to have has succeeded in increasing the population of turtles around the island.[110] The farm enterprise hoped to export turtle products, but has been prevented from doing so by CITES. Despite this the CIG continues to operate the farm. Green turtle eggs produced at the farm are incubated and raised for local consumption and release to the wild. Turtle meat is served in Cayman restaurants, but only meat from the farm. Some turtle meat is made available to the local community. Turtle stew is a traditional national dish which farm officials maintain is "an important part of the heritage of the country". Some 27,000 green turtles have been released. The research conducted at the farm has added to the understanding of the green turtles. While the farm focuses on green turtles, it also had about 400 Kemps Ridleys.[111] The Farm successful bread the Kemps Ridleys as part of a joint conservation program with Mexico. Many of these Ridleys have been returned to Mexico for use in their conservation program. The Farm retains a small stock as a genetic refugia for the wild population.[112] The farm has also become an important tourist attraction on the Caymans and reports 280,000 tourist visits annually.[113]

E. Seabirds

The authors have no information on seabird interactions with local or distant-water fishermen operating off the Caymans. Five species of seabirds nest on the Caymans (appendix D).[114]

XVI. International

A. International relations

1. Multilateral

The primary multi-lateral organization involved with swordfish is ICCAT, but other organizations are involved with fisheries.

CARICOM: The Caymans are an associate member of CARICOM which has some cooperative Caribbean fishery projects. The most elaborate joint effort has been made by the mostly English-speaking islands in the Lesser Antilles through the OECS, but CARICOM has also sponsored some initiatives.[115]

Caribbean Development Bank: The CDB received a $0.6 million loan request from the Cayman Islands Fishermen's Cooperative Society (CIFCS) in 1978.[116]

ICCAT: The International Commission for the Conservation of Atlantic Tunas (ICCAT) is responsible for international coordination of research on and management of tuna and tuna-like species in the Atlantic, including swordfish. ICCAT has established catch limits and a variety of other conservation and management measures for many of the species under its purview. As a U.K. Overseas Territory, Cayman interests are represented by the United Kingdom which is an ICCAT member.[117] The U.K. interest with ICCAT at past meetings, however, appears to have focused primarily on Bermuda and St. Helena. Notably, the small quota that ICCAT formerly provided the United Kingdom for Bermuda was changed for 2000-2002 to an overall quota for the "U.K. Overseas Territories" in general (Caribbean Overview, appendix H3b). The authors do not know at this time how the United Kingdom will apportion this quota among its territories or the process involved. The U.K. has assisted Anguilla develop a new longline fishery.[118] The authors know of no similar U.K. assistance program in the other U.K. OTs like the Caymans.

2. Bilateral

The waters immediately around the Caymans have not been extensively fished by foreign fishermen. The discussion here concerns ICCAT square 1580. Waters around Cayman Brac fall into ICCAT square 1575 which is discussed in the Jamaican chapter of this report.

Cuba: Even though the Cubans share ICCAT square 1580 with the Caymans, they do not report significant swordfish catches. The only Cuban fishing was reported in 1982 (appendix B).

Japan: Japan is the only distant-water fishing country which has reported substantial fishing off the Caymans. The Japanese were targeting yellowfin tuna and swordfish was only a bycatch. The Japanese began fishing in 1962 and they reported relatively regular activity until 1977. The swordfish bycatch was usually small, but in one quarter (the fourth quarter of 1971), 7.3 t was taken. The Japanese were most active in the third quarter of the year (appendix B). Since 1977 the Japanese have not reported any catches around the Caymans, with the exception of 1997. In most years the Japanese reported no billfish and other swordfish fishing off the Caymans.[119]

Korea: The Koreans have not fished around the Caymans (appendix B).

Spain: There is no Spanish longlining within the Caribbean basin (appendix B).[120]

Taiwan: Taiwan fishermen have not reported catches around the Caymans (appendix B).

United States: The United States began developing a longline fleet targeting yellowfin tuna in the Gulf of Mexico. U.S. longline fishermen began targeting swordfish in the mid-1980s after commercial stocks were encountered off the Florida Atlantic coast.[121] A small number of U.S. swordfish/tuna longliners are active in the wider-Caribbean, but rarely set south of Cuba or around the Caymans (figure 4). There is some activity to the west of the Caymans in the Yucatan Channel between Cuba and Mexico, but this varies from year to year.[122]

B. Joint ventures

The authors know of no Cayman joint fishery ventures.

XVII. Enforcement

The Caymans, like the other U.K. overseas territories, have the legal right to control foreign fishing in their EEZs. This includes longline fisheries for oceanic pelagics in offshore waters. In practical terms, however, the islands find monitoring foreign fishing activities difficult, especially in the outer limits of their EEZs.

The principal marine task pursued by the Cayman police is drug interdiction and search and rescue. The U.S. Coast Guard built a radar station to monitor vessel movement in the western Caribbean. One 1993 British study indicated that the Caymans lacked any sea-going enforcement platforms. This of course limited any effort to enforce the country's 200-mile EEZ. Other than small inshore launches there were was no patrol boats with sea-going capability. Cayman officials, however, addressed that limitation.[123] There is now a marine police unit with a patrol boat capable of offshore operations. The main concern appears to be demersal resources. Officials report some success in deterring foreign fishermen, Japanese fishermen were specified, from operating on fishing banks. Cayman officials have access the Royal Navy Caribbean Guard Ship for fishery protection if necessary.[124]

XVIII. Future Trends

The Caymans has only a small fishing industry, mostly harvesting demersal species on the limited shelf area around the islands and on neighboring banks in the western Caribbean. The authors know of no longliners currently in operation or plans to acquire any. While the Caymans have a relatively large 200-mile EEZ, it does not appear to include areas of high swordfish concentration, although Japanese fishermen have demonstrated that swordfish is present. British officials have advised that billfish and other sports species may be best utilized by reserving them for a recreational fishery.

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Note: This chapter was designed and formatted by William Linnoila, a Senior at Walter Johnson High School in Bethesda Maryland. William worked with NMFS as a part of the High School High/tech program. William is interested in media and public relations he will attend college in the fall of 2001 and pursue a career in business communications.

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Endnotes

SECTION I. (Overview)

1. John Bothwell, Research Officer, Department of Environment, personal communications, November 7, 2000.
2. Gene Parsons, Senior Research Officer, Department of Environment, personal communications, November 7, 2000.
3. The authors use the term "flag-of-convenience" (FOC) primarily for the sake of consistency because the term has been used in the previous volumes of *World Swordfish Fisheries*. The term, however, is open to misinterpretation and can be used to mean vastly different things to different people. Some of the Caribbean officials suggest a better term would have been "open registry". The entire issue is quite complicated. Cayman officials contend the term "flag-of-convenience" is a "misnomer". Officials at the Cayman Island Shipping Registry contend, "It seems in your case you are using it to mean vessels not beneficially owned by nationals of the flag state. Under this definition, the U.S., U.K., and many other traditional registries would have to be called flags of convenience. For example, there are U.S. registered shipping companies that have been bought out and are majority owned by non-U.S. nationals. The Treaty of Rome guarantees free movement of labor and assets providing for E.U. member state ships to be owned by companies registered in other countries within and in some cases without the E.U. In turn, the beneficial owners (shareholders) of those companies may be citizens of countries outside the E.U. altogether. The determination of genuine link is often used to identify an FOC. Where a flag-state maintains a maritime administration able to exercise effective control over the safety and pollution prevention of its fleet, then the link is established. In the Cayman Islands, this is certainly the case since we operate to the same quality standards as the U.K. In summary, the Cayman Islands are no more a flag of convenience than the U.K. because both administrations operate to the same criteria and quality standards." P.E. Gibbs, Director of Shipping, Cayman Islands Shipping Registry, personal communications, October 3, 2000.
4. Gibbs, *op. cit.*, October 3, 2000.
5. The Liberian flag-of-convenience registry is more widely known for vessels and the public often associates the practice with oil spills, pollution, accidents, and other problems. In fact, shipping analysts report that Liberian registered vessels have few safety violations and a relatively high standard is required. Much of the actual registry work is done under contract by a U.S. company. The Liberian shipping registry provides other services such as vessel safety inspections, crew licenses, satellite communications, and other services. The cost, services, and standards of other countries licensing foreign vessels are often less rigorous. "High seas agency highlights country's U.S. ties," *Washington Post*, February 4, 1997.
6. S.R. Fordham, Chief Marine Surveyor, Cayman Island Government, personal communications, October 8, 1993.
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8. Parsons, *op. cit.*, November 7, 2000.
9. Bothwell, *op. cit.*, November 7, 2000.
10. Parsons, *op. cit.*, November 7, 2000.
11. Parsons, *op. cit.*, November 7, 2000.
12. Gene Parsons, Fisheries Director, personal communication, October 5, 1993 and Parsons, *op. cit.*, November 7, 2000.
13. Parsons, *op. cit.*, October 5, 1993.
14. "JDF arrests Hondurans for illegal fishing," Bridgetown radio broadcast, CANA, 1945 GMT. August 12, 1991.
15. U.S. Customs Service data extracted by a NMFS computer program.

SECTION II. (Species)

16. Charlene Grall and Donald P. de Sylva, "Distribution, relative abundance, and seasonality of swordfish larvae," *Transactions of the American Fisheries Society*, Vol. 112, 1983, pp. 239, 243-244.
17. Dario Guitart Manday," Las pesquerias pelagico-oceanicas de corto radio de accion en la region noroccidental de Cuba," *Serie Oceanologica*, No. 31, 1975, p. 25.
18. Grall and Sylva, "Distribution ...," *op. cit.*, 243-244.

19. John Jeffrey Govoni, Bruce Stender, and Oleg Pasuk, "Distribution of larval swordfish, *Xiphias gladius,* and probable spawning off the southeastern United States," in press, advanced copy provided the authors in November 1998.
20. MRAG, "Large pelagic fisheries in the Caribbean: Their role in the development of the U.K. dependent territories," *EFZ Management Study* (Caribbean U.K. Dependent Territories, final report, 1993), p. 103.
21. MRAG, "Large pelagic fisheries ...," *op. cit.*, p. 6.
22. See the Venezuelan chapter of this report for details.

SECTION III. (Fishing Grounds)

23. F.F. Wood and J.R. Wood, "Sea turtles of the Cayman Islands," in M.A. Brunt and J.E. Davies (eds.), *The Cayman Islands: Natural History and Bibliography* (The Netherlands: Kluwer Academic Publishers, 1994).
24. J. Parsons, "The national report for the country of the Cayman Islands," in P. Beacon, F. Berry, K. Bjorndal, H. Hirth, L. Orgen, and M. Weber (eds.), *Proceedings of the Western Turtle Symposium*, Vol. 3 (Miami: University of Miami Press, 1984).
25. E. Hess, Federal Fisheries Adviser, "Report on the Cayman Islands fisheries development," unpublished report, May, 1965.
26. See Dennis Weidner and David Hall, "Latin America," *World Fishing Fleets* (NMFS: Sliver Spring, 1993), Latin America, appendices B5b1-2.
27. Weidner and Hall, "Latin America," *op. cit.*, Latin America, appendix C5.
28. Weidner and Hall, "Latin America," *op. cit.*, Cayman islands, appendix C.
29. Weidner and Hall, "Latin America," *op. cit.*, Latin America, appendix C5.
30. Available details are available in the Cayman chapter of Weidner and Hall, "Latin America," *op. cit.*, pp. 103-114.

SECTION IV. (Fleet)

31. WECAF, "Fisheries situation ...," *op. cit.*
32. MRAG, "Large pelagic fisheries ...," *op. cit.*, p. 107.
33. Bothwell, *op. cit.*, November 7, 2000.
34. "Lobster boat for the Caribbean," *World Fisheries* May, 1976, p. 47.
35. *The Fish Boat*, December, 1979.
36. MRAG, "Large pelagic fisheries ...," *op. cit.*, p. 108.
37. Wayne C. Williams, Executive Director, Integra Cay, personal communications, May 3, 1996.
38. "Black Princess Charters," website accessed July 3, 2000: http://www.charternet.com/fishers/blackprincess
39. Similarly to the United Kingdom, nationals, corporate bodies, or shipping entities from an EU or EEA state, including their overseas territories ("Qualifying States"), qualify to own Cayman registered vessels. Corporate bodies and shipping entities must be established in, and maintain a place of business in, any of the above territories. Cayman authorities point out that the qualifications to own Cayman-flag vessels were tighter in 1974, being limited to nationals or corporate bodies from any British territory. Gibbs, *op. cit.*, October 3, 2000.
40. The income was particularly important in the 1970s before the Caymans emerged as a major international financial center. "Possible windfall for Caymanians," *Caymanian*, January 18, 1974.
41. Gibbs, *op. cit.*, October 3, 2000.
42. For a detailed discussion of the flag-of-convenience registrations, including a list of possible motivations on the part of the vessel owners, see the Latin American overview section of this report.
43. Brian Jackman, "Dolphins die for your tuna," *Times* (London), June 29, 1980, p. 5, and "More US seiners leave tuna fleet," *Fishing News International*, May 1980.
44. Cayman officials point out that in legal terms care has to be used in describe the status of these vessels. "Any vessel once registered in the Cayman Islands becomes a British ship, subject to Cayman law." Gibbs, *op. cit.*, October 3, 2000.
45. Weidner and Hall, "Latin America," *op. cit.*, pp. 103-114.
46. "Second Cayman tuna catcher," *Fishing News International*, September 1997, p. 34.
47. Fordham, *op. cit.*, October 8, 1993.
48. Weidner and Hall, "Latin America," *op. cit.*, Cayman Islands, appendix C.
49. Gibbs, *op. cit.*, October 12, 2000.
50. Gibbs, *op. cit.*, October 3, 2000.

SECTION V. (Shipyards)

51. "Vessel construction," *The Fish Boat,* December, 1976 and November, 1979 and "New fishing vessels," *Fishing News International*, May 1976.

SECTION VI. (Fleet Operations And Gear)

52. WECAF, "Fisheries situation ...," *op. cit.*
53. A good historical review of the local fisheries is available in Hess, "Report ...," *op. cit.*
54. Parsons, *op. cit.*, October 5, 1993.
55. When available the vessels discussed in this report will be described in tonnages, but available data does not often provide such information.
56. MRAG, "Large pelagic fisheries ..., *op. cit.*, p. 7.
57. MRAG, "Large pelagic fisheries ...," *op. cit.*, p. 104.
58. Williams, *op. cit.*, May 3, 1996.
59. Parsons, *op. cit.*, November 7, 2000.
60. Bothwell, *op. cit.*, November 7, 2000.
61. "Blame it on la Niña," *Sport Fishing*, August, 1999.
62. Bothwell, *op. cit.*, November 7, 2000.
63. Bermuda Ministry of the Environment, *Marine Resources and the Fishing Industry in Bermuda*. Referred to as the Green Paper (MOE, January 2000), p. 19.
64. Williams, *op. cit.*, May 3, 1996.
65. Gibbs, *op. cit.*, October 3, 2000.

SECTION VIII. (Ports)

66. Williams, *op. cit.*, May 3, 1996.
67. MRAG, "Large pelagic fisheries ...," *op. cit.*, p. 104.

SECTION IX. (Transshipments)

68. "Le merlu," *Pêche Maritime*, April, 1993.
69. These vessels do not operate in the Caribbean. Cayman officials believe that they are currently operated around South Africa. Gibbs, *op. cit.*, October 3, 2000.
70. U.S. Embassy, London, "Cayman lobster trade," message number 6964, April 1, 1987 and U.S. Department of State, "USG response to GOC complaints about alleged Vasquez-Saccio Fishing treaty violations," message number 408438, December 20, 1988.

SECTION X. (Processing And Products)

71. Williams, *op. cit.*, May 3, 1996.

SECTION XI. (Companies)

72. "Cayman Islands project," *World Fishing*, March 1978.
73. "Second Cayman tuna-catcher," *Fishing News International*, September 1997, p. 34.
74. H.E. Ross, Cayman Islands Seafarers' Association, personal communications, October 16, 2000.

SECTION XII. (Markets)

75. WECAF, "Fisheries situation ...," *op. cit.*
76. Bothwell, *op. cit.*, November 7, 2000.
77. Parsons, *op. cit.*, November 7, 2000.
78. Parsons, *op. cit.*, November 7, 2000.

SECTION XIII. (Government Policy)

79. E.R. Fidell and W. Edeson, "Fisheries legislation in the Cayman Islands," *Fisheries Legislative Report*, 81/1 (WECAF: Panama City, September 1981), 32 p.
80. MRAG, "Large pelagic fisheries ...," *op. cit.*, p. 103.
81. Parsons, *op. cit.,* November 7, 2000.
82. Proclamation, December 12, 1977.
83. Cayman Island (Territorial Sea) Order, January 1, 1990.
84. The Marine Conservation Act, 1978, Section 10.
85. First schedule, The Fisheries Rules, 1982, as cited in Gerald Moore, "Coastal State Requirements for Foreign Fishing," *FAO Legislative Study*, No. 21, rev. 3 (FAO: Rome, 1988), p. 324.
86. Parsons, *op. cit.*, October 5, 1993.
87. Bothwell, *op. cit.*, November 7, 2000.
88. MRAG, "Large pelagic fisheries ...," *op. cit.*, p. 104.
89. MRAG, "Large pelagic fisheries ...," p. 104.
90. P.G. Bush, G.C. Ebanks, and E.D. Lane, "Validation of the aging technique for the Nassau grouper (*Epinephelus striatus*) in the Cayman Islands," in F. Arreguin-Sanchez, *et. al.* (eds.) "Biology, fisheries, and culture of tropical groupers and snappers," *ICLARM Conf. Proc*, Vol. 48, 1996, pp. 150-158. Another report on the Nassau grouper is to be published in *Fisheries Bulletin*.
91. J.W. Tucker, J.E. Parsons, G.C. Ebanks, and P.G. Bush, "Induced spawning of Nassau grouper *Epinephelus striatus*," *Journal of the World Aquaculture Society*, Vol. 22, 1991, No. 3, pp. 187-191.
92. Bothwell, *op. cit.*, November 7, 2000.
93. Gibbs, *op. cit.*, October 3, 2000.

SECTION XIV. (Research)

94. MRAG, "Large pelagic fisheries ...," *op. cit.*, pp. 103-104.
95. Lee H. Harris, "Summary of activities and capabilities: Florida Institute of Technology," in Brown, Erb, and Maul, ed. *Intra-Americas Sea Marine Science Meeting of U.S. Experts* (NMFS: Miami, 1992), p. 90.
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97. Williams, *op. cit.*, May 3, 1996.
98. Bothwell, *op. cit.*, November 7, 2000.
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SECTION XV. (Bycatch)

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101. H.E. Ross with the Cayman Islands Seafarers Society has interviewed the fishermen and plans to write an article for a report on Cayman Island turtling and plans to include a small chapter on shark fishing. Ross, *op. cit.*, October 16, 2000.
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110. "The Cayman Turtle Farm: A unique farm links modern Cayman with its seafaring past," *Key to the Cayman Magazine*, date unavailable.
111. Cayman Turtle Farm, "Facts about the Cayman Turtle Farm," internet posting accessed October 10, 2000: http://www.caymans.com/Turtles.htm
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114. Ruud van Halewyn and Robert L. Norton, "The status and conservation of seabirds in the Caribbean," in J.P. Croxall, P.G.H. Evans, and R.W. Schreiber (eds.), "Status and conservation of the world's seabirds," *ICBP Technical Publication*, No. 2 (ICBP: Cambridge, 1984).

SECTION XVI. (International)

115. See the Caribbean chapter of this report for details on CARICOM fishery activities.
116. "Cayman Islands project," *op. cit.*
117. Individual European Union members are no longer ICCAT members. It was agreed at the 1997 annual ICCAT meeting that all EC Member States would withdraw from the Commission effective December 31, 1997. The sole exceptions were France and the United Kingdom which then rejoined in respect of their overseas territories.
118. See the Anguilla chapter of this report for details.
119. Y. Uozumi, "Preliminary analysis on the distribution of sailfish and longbill speerfish in the Atlantic Ocean in 1993 based on the logbook data," *ICCAT Collective Volume of Scientific Papers*, (ICCAT: Madrid, Spain, 1995), p. 29 and ICCAT, "1994 SWO background document: Figures," *ICCAT Collective Volume of Scientific Papers* (ICCAT: Madrid, Spain, 1995), p. 91.
120. ICCAT, "1994 SWO background document: Figures," *op. cit.*, p. 91.
121. Details on the U.S. swordfish fishery are available in Karyl K. Brewster-Geisz, "United States," *World Swordfish Fisheries*, Vol. V. (NMFS: Silver Spring, Maryland), pp. 63-102.
122. Jean Cramer and Heather Adams, "Large pelagic logbook newsletter - 1996," *NOAA Technical Memorandum* (NMFS-SEFSC-407), January 1998, p. 3 and Jean Cramer, "Large pelagic logbook newsletter - 1995," *NOAA Technical Memorandum* NMFS-SEFSC-394, November, 1996, p. 3.

SECTION XVII. (Enforcement)

123. MRAG, "Large pelagic fisheries ...," *op. cit.*, p. 105
124. Gibbs, *op. cit.*, October 3, 2000.

Appendix A.--Cayman Islands. Fisheries catch, 1980-99

Year	Catch		Total
	Caribbean	Distant-water	
	Metric tons		
1980	Negl	500F	500F
1981	Negl	3,992	3,992
1982	Negl	933	933
1983	Negl	655	655
1984	Negl	423	423
1985	Negl	396	396
1986	Negl	476	478
1987	76	1,021	1,097
1988	112	274	386
1989	110F	505	615F
1990	110F	727	837F
1991	125	461	586
1992	125	433	558
1993	125	320	445
1994	110	320	430
1995	112	200	312
1996	115	200	315
1997	115F	200F	315F
1998	125	-	125
1999	125	-	125

Note: The authors note that in the 1999 *Yearbook*, the distant-water catch was excluded.
F - FAO estimate
NA - Not available
Source: FAO, *Yearbook of Fishery Statistics*, (FAO: Rome, various years).

Appendix B.--Foreign fishing. Swordfish catches by quarter in ICCAT square 1580*, 1963-97

Country	Year	Quarter				Total
		1	2	3	4	
Cuba	1982			1.7		1.7
Japan	1963				0.2	0.2
	1964	0.6	0.9	0.9	0.2	2.6
	1965	0.2		4.0	3.0	7.2
	1966		0.3	0.4		0.7
	1968		0.1			0.1
	1969			0.6		0.6
	1970			0.1		0.1
	1971			3.8	7.3	11.1
	1972			1.4		1.4
	1975	0.9		4.9		5.8
	1976		0.1	0.7		0.8
	1977			0.2	0.1	0.3
	1997				0.1	0.1
Korea	No activity reported					
Spain	No activity reported					
Taiwan	No activity reported					
United States	Data unavailable**					

* Cayman waters extend into ICCAT square 1575, but this is reviewed in the Jamaican chapter.
** U.S. data was not available in ICCAT 5° squares at the time of publication.
Source: ICCAT website: http://www.iccat/es/Stats.html, retrieved July 3, 2000.

Appendix C1.--Cayman Islands. Swordfish exports by destination, 1991-99

Destination	Year									
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
	Metric tons									
United States	-	-	-	-	-	-	-	-	-	-*
Japan**	11	6	-	-	-	-	-	-		
European Union	NA	-	-	-	-#					
Others***	NA	NA	NA	NA	NA					
Total	NA	6	-	-	-					

* Through February
\# Through November
** Estimated swordfish portion of billfish shipments
*** Swordfish shipments to other countries are believed to be non-existent or negligible
Source: Various

Appendix C2a.--United States. Swordfish imports from the Cayman Islands, 1975-2000

Year	Commodity		Total*
	Fresh	Frozen	
	Metric tons		
1975	-	-	-
1976	-	-	-
1977	-	-	-
1978	-	-	-
1979	-	-	-
1980	-	-	-
1981	-	-	-
1982	-	-	-
1983	-	-	-
1984	0.1	-	0.1
1985	-	-	-
1986	-	-	-
1987	-	-	-
1988	-	-	-
1989	-	-	-
1990	-	-	-
1991	-	-	-
1992	-	-	-
1993	-	-	-
1994	-	-	-
1995	-	-	-
1996	-	-	-
1997	-	-	-
1998	-	-	-
1999	-	-	-
2000**	-	-	-

* Totals may not agree due to rounding.
** Through April
Source: U.S. Bureau of the Census

Appendix C2b.--United States. Swordfish imports from Cayman Islands, 1975-2001

Year	Commodity		Total*
	Fresh	Frozen	
	US$1,000		
1975	-	-	-
1976	-	-	-
1977	-	-	-
1978	-	-	-
1979	-	-	-
1980	-	-	-
1981	-	-	-
1982	-	-	-
1983	-	-	-
1984	Negl	-	Negl
1985	-	-	-
1986	-	-	-
1987	-	-	-
1988	-	-	-
1989	-	-	-
1990	-	-	-
1991	-	-	-
1992	-	-	-
1993	-	-	-
1994	-	-	-
1995	-	-	-
1996	-	-	-
1997	-	-	-
1998	-	-	-
1999	-	-	-
2000	-	-	-
2001*	-	-	-

* Through August
Source: U.S. Bureau of the Census

Appendix C3a.--Japan. Swordfish and marlin imports from the Cayman Islands, 1986-99

Year	Quantity	
	Billfish	Swordfish
	Metric tons	
1986	-	-
1987	14	5E
1988	65	22E
1989	66	22E
1990	34	11E
1991	19	6E
1992	-	-
1993	-	-
1994	-	-
1995	-	-
1996	-	-
1997	-	-
1998	-	-
1999	-*	-*

* Through November.
E - Estimated swordfish proportion of billfish imports
Source: Japan Tariff Association, *Japan Exports & Imports*, various years.

Appendix C3b.--Japan. Swordfish and marlin imports from the Cayman Islands, 1990-99

Year	Quantity	
	Fresh	Frozen
	Metric tons	
1990		
Trunks*	-	30.8
Fillets**	-	3.2
Total		34.0
1991		
Trunks*	-	15.8
Fillets**	-	2.9
Total		18.7
1992	-	-
1993	-	-
1994	-	-
1995	-	-
1996	-	-
1997	-	-
1998	-	-
1999	-#	-#

* All swordfish and marlin excluding fillets, other fish meat, livers, and roes.
** Mixed category including tuna, swordfish, and marlin.
\# Through November.
Source: Japan Tariff Association, *Japan Exports & Imports*, various years.

Appendix D.--Cayman Islands. Seabird nesting, 1984

Area	Information	Species*	Known** threats	Importance***
Cayman Islands	Reasonable	6, 7, 9, 10, 20	Ha, Ex?, Pr?	Regular

* Species: 6 - Phaethon lepturus; 7 - Fregata magnificens; 9 - Sula sula; 10 - S. leucogaster; 20 - S. (albifrons) antillarum.
** Threats: Ex - exploitation of eggs, young or adults; Pr - predators, generally introduced mammals; Ha - habitat distruction or disturbances; Po - pollution; Fi - fisheries
*** A rough subjective rating of relative importance of area for breeding seabirds.
Source: Ruud van Halewyn and Robert L. Norton, "The status and conservation of seabirds in the Caribbean," in J.P. Croxall, P.G.H. Evans, and R.W. Schreiber (eds.), "Status and conservation of the world's seabirds," *ICBP Technical Publication*, No. 2 (ICBP: Cambridge, 1984), p. 175.

8. CUBA

Cuba has conducted the largest commercial longline fishery of any Caribbean country, although the fishery operates largely outside the Caribbean. Cuba is also the only Caribbean country to develop an artisanal fishery for large pelagics, including swordfish. Some artisanal fishermen are reported to have been taking billfish and other large pelagics out of northwestern ports near Havana during the late 19th century. More detailed reports are available on this fishery in the 1940s-50s describing relatively basic gear. The fishery was immortalized by American writer Ernest Hemingway in his classic, *The Old Man and the Sea*. Improved basic longlines were introduced in the 1960s. After the 1959 Cuban Revolution, the new Government decided to give increased attention to fisheries and to build a modern commercial fishing industry. Cuban coastal waters, however, offered only limited prospects for significantly expnding the catch, and officials decided to initiate distant-water operations--despite the limited Cuban experience with such operations and the substantial investment required. Such operations necesitated the construction of large, expensive vessels in foreign shipyards and the training of skilled technical personnel to operate them. Commercial longliners were purchased in Japan and Spain during the 1960s at considerable expense. These longliners were the first large fishing vessels ever operated by Cuban fishermen. Revolutionary leaders looked upon the acquisition of these longliners, as well as other large commercial fishing vessels, with great pride--seeing their modern distant-water fleet to be a major achievement of the Revolution. Japanese and other foreign experts helped train Cuban fishermen. The Japanese played a particularly prominent role in the longline fishery. The Cubans adopted Japanese fishing methods in the 1960s and continued using the same gear and fishing strategy with few changes into the 1980s. The Soviets cooperated with experimental trials in the western Atlantic, but it was primarily Japanese experts who helped launch the Cuban longline fishery. Officials decided to concentrate primarily on yellowfin tuna in the eastern and central Atlantic at tropical latitudes. The tuna catch was largely exported to European countries and the swordfish to Europe and Japan by transhipping through Las Palmas. Cuban distant-water operations from the beginning proved unprofitable, despite access to subsidized Soviet fuel. The economics of the longline fishery, like other Cuban distant-water fisheries, appear to have been poorly assessed. Many problems were encountered. The lack of experience was a serious impediment. Another problem was declining catch rates because of heavy fishing in the Atlantic, but foreign fleets--unlike the Cuban fleet--still reported profitable operations. Cuban longline operations never achieved the production levels fleet managers had anticipated, despite the investment of millions of dollars. Fleet managers never altered the fishing methods and strategy adopted from the Japanese in the 1960s, despite major innovations by other countries. A major failing proved to be the inability to produce high-quality tuna that could be sold for high prices in the Japanese market. Cuba's creation of a separate tuna fleet, the Flota Atunera de Cuba (FAC) in 1973-74, does not appear to have significantly improved the profitability of longline operations. The FAC longline operations did generate some hard currency earnings--although the real costs of those earnings have never been made public. Cuba's fleet proved so unprofitable that the country never built another commercial longliner. Some smaller vessels were converted for longlining, a project that also did not prove profitable. Cuban fishermen by the 1980s were regularly reporting swordfish catches exceeding 900 metric tons. The peak swordfish catch was nearly 1,500 tons in 1985. FAC operations required substantial, continuing deficit funding. Even before the termination of the Soviet fuel subsidy in the early 1990s, the Development Commission of the Ministry of the Fishing Industry decided to retire the remaining distant-water longliners, although they continued operating a few longliners into the 1990s. Fuel by the 1990s had to be purchased with hard currency. The aging vessels were increasingly costly to maintain. The last distant-water longlining was reported in 1996. The FAC fleet was mostly sold for scrap. While Cuba has stopped commercial longlining, fishermen continue to operate a few small artisanal longliners out of northwestern ports. Swordfish catches have dropped to minimal levels. Cuban officials continue to be interested in distant-water fishing. The small projects approved by the Government in recent years, however, have involved trawling rather than longlining. The country has knowledgeable commercial fishermen and the infrastructure and technicians capable of operating commercial longliners. Some of these individuals have been contracted to work on foreign fishing vessels and trawling joint ventures. There are no projects to acquire new longliners. The limited availability of investment capital, that the Government is attempting to use more efficiently than in the past, would appear to make any major new commitment to longlining unlikely at this time. One of the ironies of the Cuban tuna/swordfish fishery is that the large longliners which were acquired with great pride and used to show case the Revolution's progress, proved to be financial white elephants and required the Government to subsidize sizeable deficits. This was in sharp contrast to the more profitable and well-managed lobster fishery that was conducted in coastal waters by relatively small artisanal boats built in domestic shipyards.

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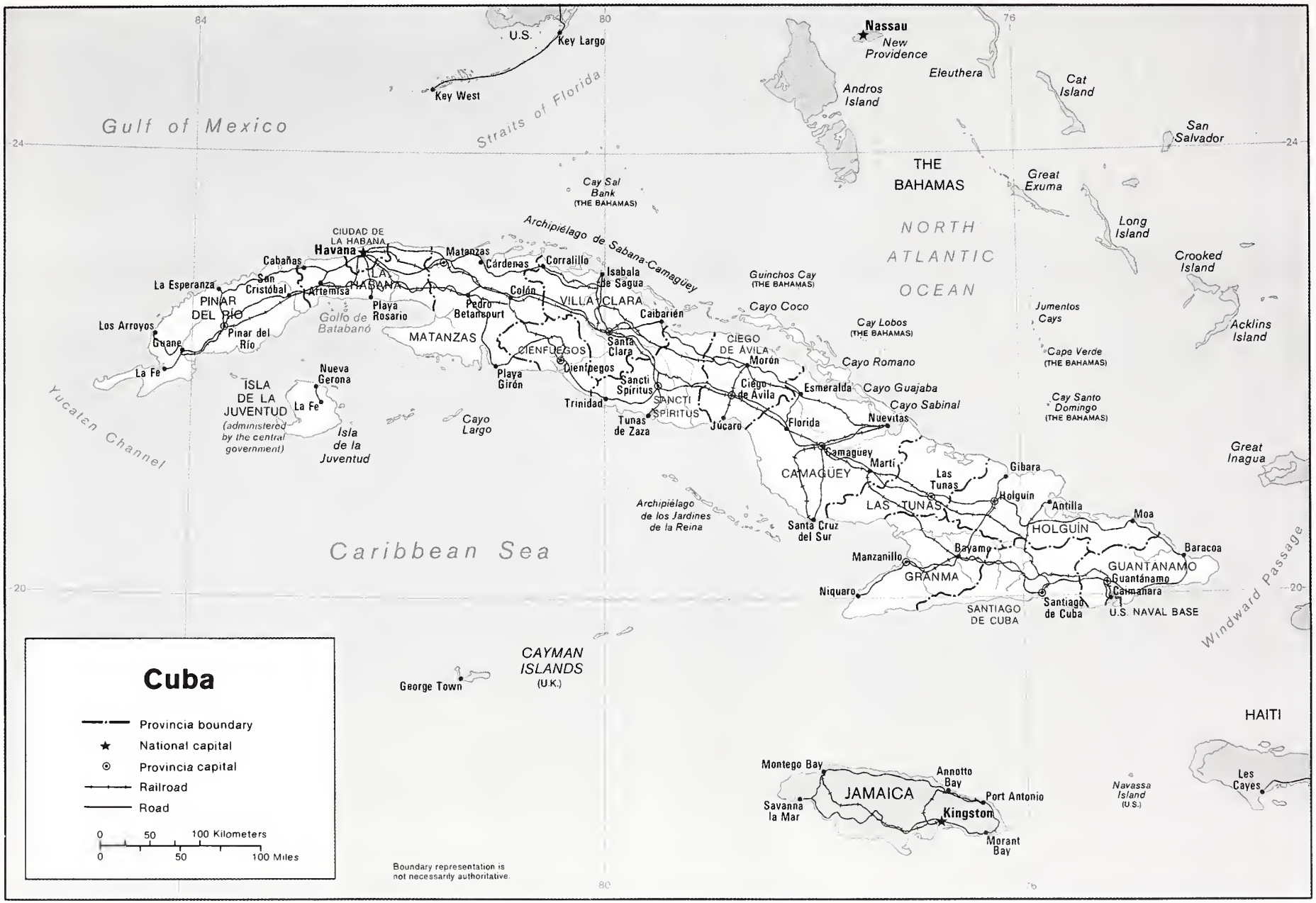

Figure 1.--Map of Cuba

I. Overview[1]

A. Background

1. History

Cuba was discovered by Columbus and, except for a brief British occupation (1762-63), remained a Spanish colony until the Spanish-American War (1898) and independence (1902). Spanish settlers established sugar cane and tobacco plantations to produce Cuba's most valuable products. The planters enslaved the native Indian population to work on the plantations, but when they died out, African slaves were imported to replace them. While growing English and French naval power allowed these countries to seize the smaller islands in the Caribbean, the substantial Spanish population on Cuba made the island a more difficult target to occupy. Cuba was Spain's principal Caribbean colony. The island's extensive sugar plantations were a valuable source of income for Spain throughout the 17th, 18th, and 19th centuries. Spain abolished slavery in 1886.

Cuba was the last Spanish colony in the New World to gain independence. A growing desire for independence, as elsewhere in the Spanish empire, led to a protracted, bitter struggle by the Cubans to break away from Spain. Cubans began their fight for independence in 1850. The brutal struggle became the subject of intense, often lurid reporting in the American press which intensified during the 1890s. When the U.S. battleship *Maine* exploded in Havana harbor during 1898, American newspapers demanded war. The United States intervened on the island in the Spanish-American War of 1898, but U.S. forces did not cooperate closely with the Cuban revolutionaries already fighting the Spanish. Under the terms of the 1898 Treaty of Paris ending the War, Spain granted Cuba independence. The United States did not, however, formally recognize Cuban independence until 1902. At that time, the United States retained the right to intervene to preserve Cuban independence and stability under the Platt Amendment. The U.S. Congress in 1934 repealed the Platt amendment and the United States and Cuba reaffirmed the 1903 agreement which leased the Guantanamo Bay naval base to the United States. The treaty remains in force and can only be terminated by mutual agreement or abandonment by the United States.

After independence, a series of largely ineffectual Cuban Governments struggled with democracy. American investors made extensive investments in Cuba, and came to play a major role in many key Cuban industries. President Machado in 1928 decided to give himself another term without an election. A group of army sergeants, led by Fulgénico Batista, seized power in 1933. Batista was to dominate Cuban politics, usually ruling behind puppet presidents, for the next three decades. Batista introduced some popular reforms, but over the years his increasingly corrupt rule eventually proved unpopular with Cubans who desired to reinstated democratic government. After losing an election in 1944 Batista seized power by a *coup d'etat* in 1952. He turned to the police and army to suppress all democratic opposition.

Photo 1.--Havana's El Moro castle symbolizes Cuba's Spanish colonial past. It guards the entrance to one of the best natural harbors in the wider-Caribbean. Mark Grace

Fidel Castro in the 1950s led a revolution attracting the support of a wide-spectrum of Cubans committed to establishing democratic government in Cuba. After several years of struggle, Castro and the 26th of July movement seized power from Batista in 1959. Many but not all observers believe that Castro, fearful that he could not maintain his personal power in freely contested elections, broke with his democratic supporters, and proceeded to established a totalitarian communistgovernment--although he did not immediately make this public. He increasingly turned to the Soviet Union for economic, financial, and military support. Scholars vary in their assessment as to what extent Castro's turn to the Soviets was affected by increasing U.S. support culminating in the failed Bay of Pigs (Playa Girón) invasion on April 17, 1961. Castro after the invasion finally declared his intentions to make Cuba a socialist state on April 16, 1961.[2] For the next 30 years, Castro pursued close relations with the Soviet Union until the advent of *perestroika* and the subsequent dissolution of the Soviet Union in 1992.

Photo 2.--Education in Cuba has a strong ideological component, but basic levels are accessible to all and academic standards are relatively high. Dennis Weidner

Soviet advisors assisted Revolutionary authorities in the mechanisms of instituting and maintaining totalitarian rule, stifling the free expression of political thought and ideas. The Cuban political system, however, has brought large numbers of formerly abjectly poor citizens within the political system. This and the regime's emphasis on universal education has created an element of popular participation lacking in many Latin American countries with contested, democratic elections. Cubans through various mass organizations are allowed to discuss and debate a wide range of local or shop-level concerns. They are not, however, allowed to form organizations like independent labor unions to contest work rules and wages. The authors know of no independent environmental group that has openly criticized government policies or the operations of state corporations affecting the environment. Cubans are not permitted to publish articles criticizing basic elements of the Cuban political system, or the nature of the regime itself. These issues are still essentially personal decisions made by Castro and cannot be challenged. Criticism of the regime is generally tolerated in personal conversations, but can lead to denial of educational opportunity, demotions, or even dismissal from jobs. Any such personal criticisms are often noted by the local Committees for the Defense of the Revolution and become part of personal files maintained by the Cuban police.

The Soviets helped Revolutionary Cuba introduce a Soviet-style command economy. Although time does not permit a full discussion of Cuban economic policies in this report, it should be noted that the Cubans did not immediately adopt a Soviet economic system in the 1960s. Some of the early Cuban economic experiments were influence by the Chinese communist economic system. By the end of the 1960s there were 80,000-100,000 state enterprises in Cuba ranging from a nickel plant that had a staff of 12,000 down to a barber shop with one barber. Amazingly there were virtually no accountants to keep track of this chaotic system. Revolutionary authorities did not think accountants were useful and had sent them to work in agriculture![3] The resulting economic chaos gradually forced Revolutionary authorities to turn increasingly to the Soviets and Soviet models became more influential. The Cubans in 1972 joined the Council for Mutual Economic Assistance (CMEA), a Soviet sponsored trade group. The Cuban economy was thus increasingly tied in with that of the Soviet Union and its Eastern European client states. There were also

been experiments with free market approaches which often were quite successful. In light of the collapse of Soviet communism and its system of command economics, Castro's decision to adopt such a system now appears to have been an ill-conceived choice. In the 1960s, however, many leaders in the developing world did not see communism and command economics as a failed political and economic system. Many were influenced by Soviet claims that their system was superior. Soviet technical achievements like Sputnik impressed many. For Castro the allure of a more egalitarian society promised by the communists may have been an important factor. Perhaps more importantly, a free market economic system would eventually erode Castro's total control over the political structure.[4] Under a communist dictatorship, he could exert unquestioned personal control over the political and economic life of Cuba--without the complications of democratically contested elections.

2. Economy

Castro's 40-year rule has profoundly changed the character of Cuban society making it a country unlike any other in the rest of the Caribbean or Latin America. The Revolutionary Government has instituted notable reforms in education, public health, racial justice, and other areas. Many of the inequities apparent elsewhere in Latin America have been substantially reduced in Cuba as a result of these reforms. While abject poverty has been eliminated, living standards of the Cuban population as a whole have declined. Cuba today is a country of contradictions. While living standards are low, the population is not experiencing widespread malnutrition. The country has low infant mortality rates (a key indicator of health care), impressive educational achievements, and no measurable homelessness. One of the many contradictions of modern Cuba is that the Revolutionary Government has succeeded in making basic education available to a wide-spectrum of the Cuban people. Literacy rates are extremely high. There is a heavy ideological bent to the curriculum, but academic standards are relatively high. Access to higher education is available to most Cubans, regardless of income, although political conformity is an important element in selecting students for advanced studies, often more important than academic ability. Substantial numbers of Cubans have been able to obtain university degrees. This has meant, however, that because of the inefficient economy, the well-educated Cuban population, has few opportunities for employment at reasonable salaries.

The Revolutionary Government's first actions, after conducting show trials and televised executions of Batista officials, was to seize private land holdings (May 1959)--causing an immediate decline in food production, a problem which continues to affect the country even today. The Revolutionary Government then proceeded to seize foreign assets and local companies to create a Soviet-style economy which has proved no more successful in Cuba than in the Soviet Union. Even basic consumers good are today, 40 years after the Revolution, unobtainable by most Cubans. Cuban diets are extremely restricted. Milk is available in limited quantities and only for very young children.[5] Meat and eggs are strictly rationed (appendix D1). Attempts to manage a planned economy proved disastrous and, despite massive Soviet economic subsidies, succeeded in turning Cuba, which was in 1959 one of the richest Latin American countries, into one of the poorest in the hemisphere--requiring massive Soviet subsidies to survive. Cuba encountered a variety of problems as it reoriented its economy from a free market system to a communist command economy and its foreign trade from the United States to the Soviet Union and its Eastern European client states.

The Food and Agriculture Organization (FAO) of the United Nations in the 1960s was assisting Cuba with fisheries and other economic sectors. The reports published by FAO during this era provide interesting glimpses into this process. One of the observations early on was that the pricing system adopted in Cuba was seriously flawed. The FAO Fisheries Advisor in Cuba at this time, Manuel Achura Larraín, found that there did not seem to be a relationship between the costs of production and prices. This problem appeared to be especially serious at intermediate production levels. This made it enormously difficult to evaluate the efficiency of production units and to make informed investment decisions.[6] Even if a Cuban planner wanted to consider real economic costs, that information does not seem to have been available to him. There was no published data in Cuba on actual production costs of Cuban enterprises, including fisheries.[7] Even more telling, Cuban managers did not even seem to have access to unpublished production cost data--suggesting such data simply did not exist.[8] Adding to this was the fact that Cuban companies operated with three currencies: pesos, rubles, and dollars. All of this in a country which thought that there was no real need for accountants.

The inefficiencies of the Cuban economic system and reduction of the Soviet assistance program caused increasing economic problems in the late 1980s.[9] The termination in 1992 was a disaster, causing caused a

severe depression in Cuba. The already weak Cuban economy suffered a decline in output of an estimated 35 percent between 1989-93.[10] Some estimates are much higher.[11] Cuba in 1986 had defaulted on most of its debt to western countries, estimated at $11 billion in hard currency.[12] As a result, Cuba remains outside of international financial institutions like the World Bank. To finance imports, Cuba is forced to rely on short term loans--often at extremely high interest rates.

Cuban officials have introduced, in many cases grudgingly, a number of reforms and new policies to help the country adjust to the loss of Soviet assistance.

Promote tourism: The Government began promoting tourism to attract foreign visitors with hard currency. This was a sharp reversal of policy. President Castro once despised tourism and associated it with Mafia corruption and prostitution. This has changed in Cuba today where Revolutionary officials now extol the tourist industry and welcome foreign tourists. Tourism has replaced sugar as the economy's principal source of foreign exchange earnings and is the island's fastest growing industry. Cubans themselves have only limited access to these facilities which generally require payment in foreign currency.

Foreign investment: The Government began promoting foreign investment. The initial Cuban efforts to attract investment were hardly encouraging to foreign investors.[13] Cuba has since reported much greater success. Interestingly, while foreigners are allowed to invest in Cuba, Cubans citizens are not allowed to do so. Most foreign investment has taken the form of loans to finance supplies and services rather than equity participation.

Dollars: The Revolutionary Government made it a crime for Cuban citizens to hold the U.S. dollar. Mere possession could result in prison terms. The Government in 1993, however, legalized the possession of U.S. dollars by Cuban citizens. The dollar, as a result, quickly became Cuba's *de facto* national currency. Many businesses, including state enterprises, and individuals will not accept their own national currency--the peso.

Central bank: Cuba created the Banco Central de Cuba in 1997 to play a monetary role like of a central bank in a market economy.

Service industry: The Government in the mid-1990s began to allow Cubans to offer services privately under strict government regulation and scrutiny. These entrepreneurial opportunities proved enormously popular, but officials apparently concluded that it was threatening the underpinnings of the socialist economy. The Government thus introduced heavy taxes forcing some of the most successful service providers out of business.[14] Some Cuban observers report that authorities have begun to replace restrictions on private service providers to keep them from competing with state operations.[15]

Farmers' markets: The Government in 1994 reintroduced farmer's markets.[16] State and private farmers were allowed to sell their production above set quotas at market prices and for dollars. Fish cannot legally be sold at these markets. This is because farmers can legally sell production over a quota. Cuban fishermen, however, can only legally sell to a state-own marketing unit. Financial incentives have been introduced for the fishermen who exceed their quotas, but the fishermen are only allowed to sell to the Government purchasing unit--ACEPEX. The farmers' markets have had a major impact in relieving food shortages and nutritional problems.[17] The prices, however, are extremely high for Cubans without access to dollars.

State enterprises: State enterprises have been required to adopt accounting and investment practices more in line with actual corporations.[18] Cuba had no alternative but to adopt more business-like practices. Without the Soviet subsidy, the Cuban Government simply could not afford to continue financing the massive deficits that state-owned enterprises were incurring. The goal is to force state companies to actually achieve profitable operations. It is unclear at this time to what extent this goal is being achieved. Major improvements in fuel economy have been reported which would reflect favorably in profit calculations (appendix C1b). The Government has made optimistic pronouncements.[19] A serious effort has clearly been made because some state corporations have been closed and other that continue to function have reduced or terminated unprofitable operations. A variety of reports from Cuba confirm that Cuban officials and managers are being forced to make major changes in their operations.[20]

These market reforms were taken reluctantly and Castro and his Socialist planners are concerned about their long-term impact on the socialist ethic of the population. Some Cuban officials object ideologically to the farmer's markets and other free-market reforms (allowing private individuals to provide services and foreign investment). Some see them as temporary expedients.[21] Others view them as the first stages in needed fundamental changes. This view is not often expressed openly as it involves changes to some of the precepts personally championed by Castro himself. Some observers in Cuba report during 2001 that now as the economy has improved somewhat, authorities have already begun to limit some of the free market reforms that have proven so successful.[22]

The reforms viewed so warily by many Cuban officials are precisely the actions that have stimulated some recovery in Cuba's moribund state-controlled economy. Economic conditions have clearly improved from the most depressed levels of the early 1990s. The irony involved is palpable. President Castro has reversed himself on some of his most strongly held positions. Castro in lengthy, impassioned speeches railed against the American dollar and dolled out lengthy prison terms for mere possession of dollars has had to make the U.S. dollar basically the effective currency of Cuba. Castro also presented foreign investment as a major evil, but now actively courts it. Foreign tourists were another favorite target, but now tourism is the economy's most profitable sector. Many of the economic changes in the 1990s were to facilitate the operations of foreign companies in the tourist sector. Tipping was once frowned upon, but now provides an important part of the income of many Cuban workers. Bellhops and maids in a tourist hotel, because they have access to dollars, may earn more than doctors and other professionals.[23] In short, Castro's utopian socialist economy has had to be rescued by privatizing services and opening farmers' markets and tourists from capitalist countries. The fishing industry was not unaffected by these changes. The industry which had played an important role in providing low-cost fish to the Cuban consumer refocused on supplying luxury seafood to foreign tourists.

Despite the positive economic impact, the continuation of the free market reforms and future direction that the next generation of Cuban leaders will take the economy is largely unknown. Opinions vary widely. It must be remembered that this is not the first time that Revolutionary Cuba has experimented with free market reforms and then turned back to a command economy and centralized planning.[24] While the current reforms are significant, some observers believe they do not strike at the primary impediments to economic growth and reflect, as one analyst put it, "more continuity than change".[25] Another U.S. author asserts that private enterprise is currently possible in Cuba "only because and insofar as it has remained socialist." This writer argues that by guaranteeing basic necessities, individuals can pursue small private enterprises.[26] Other observers believe that there are limits to the economy's expansion in a country where individuals can not build important businesses and acquire significant personal assets. Many Cubans ask the same questions. But there are also large numbers of Cubans who are devoted to the egalitarian principles of the Revolution. These principles are especially strongly felt in the military and institutions of state security. Thus the future direction of the Cuban economy is an open question.

The impact of the United States on the Cuban economy has been the subject of impassioned debate for four decades. The authors note that in regard to the economy, Cuban officials as a matter of course blame the U.S. embargo for virtually all of their country's economic problems--generally avoiding responsibility for Cuba's economic condition. The embargo certainly has had a major impact. Some observers, however, would argue that the very nature of the Cuban economic system and poor management has done more damage to the Cuban economy than the embargo.[27] An interesting aspect about the U.S.-Cuban relationship is the huge amount of money Cubans in the United States send to their relatives in Cuba. Estimates vary, but these remittances ("remesas") probably account for about 10 percent of the Cuban economy and makes the United States in essence the major financial contributor to the Cuban economy and in Cuba, as a percentage of the economy, the single most important recipient of U.S. assistance.[28]

3. Government

Photo 3.--Cuba is a totalitarian sate personally controlled by President Fidel Castro through the Cuban Communist Party. D. Weidner

Cuba is a totalitarian state controlled by President Fidel Castro, who is Chief of State, Head of Government, First Secretary of the Cuban Communist Party (PCC), and commander in chief of the armed forces. Castro exercises control over all aspects of Cuban life through the Communist Party and its affiliated mass organizations, the government bureaucracy, the state security apparatus, and his personal magnetism and popularity with the Cuban people. The Ministry of Interior is the principal organ of state security and control. In addition to the routine law enforcement functions of regulating migration, controlling the Border Guard and the regular police forces, the Ministry's Department of State Security investigates and actively suppresses organized opposition and dissent. Committees for the Defense of the Revolution (CDRs) have been organized block by block in every Cuban town and city. The CDRs have a variety of civic responsibilities such as public sanitation, but they are also a key element of the state security system. Residency permits are required and the CDRs know who is living in each household and help compile detailed personal information. The CDRs and other organs of state security provide information as to an individuals "reliability" that can affect access to higher education and employment.[29]

The Cuban Government explains that "The Republic of Cuba is a socialist state of independent and sovereign workers, organized as a unitary and democratic republic."[30] Fidel Castro personally ruled by decree from January 1959 until December 1976. The 1976 constitution, extensively revised in 1992, enshrines the Cuban Communist Party (PCC) as "the highest leading force of the society and state." In addition to Fidel Castro and his brother Raúl Castro, the center of party power is the 24-member Politburo. There are 149 members in the Central Committee. Executive and administrative power is vested in the Council of State and the subordinate Council of Ministers, over which Fidel Castro presides, supported by six vice-presidents. Legislative authority rests with the National Assembly of People's Power, which meets annually for about 5 days, and is state-controlled. When not in session, the Assembly is represented by the Council of State. Fidel Castro is president of the Council of State, and his brother, Raúl Castro, is first vice president, which places him first in the line of succession. Raúl Castro is also the Minister of the Revolutionary Armed Forces.

The PCC is constitutionally recognized as Cuba's only legal political party. The party's Politburo and Central Committee together include most of the country's military and civilian leaders. The party monopolizes all important government positions, including judicial offices. Though not a formal requirement, party membership is a *de facto* prerequisite for high-level official positions and professional advancement in most areas, although non-party members are sometimes allowed to serve in the National Assembly. The National Assembly amended the 1976 constitution in 1992, abolishing references to the former Soviet bloc, outlawing discrimination for religious beliefs, permitting foreign investment, giving Fidel Castro new emergency powers, and allowing for the direct elections to the National Assembly of candidates approved by "mass organizations" controlled by the Communist Party.[31]

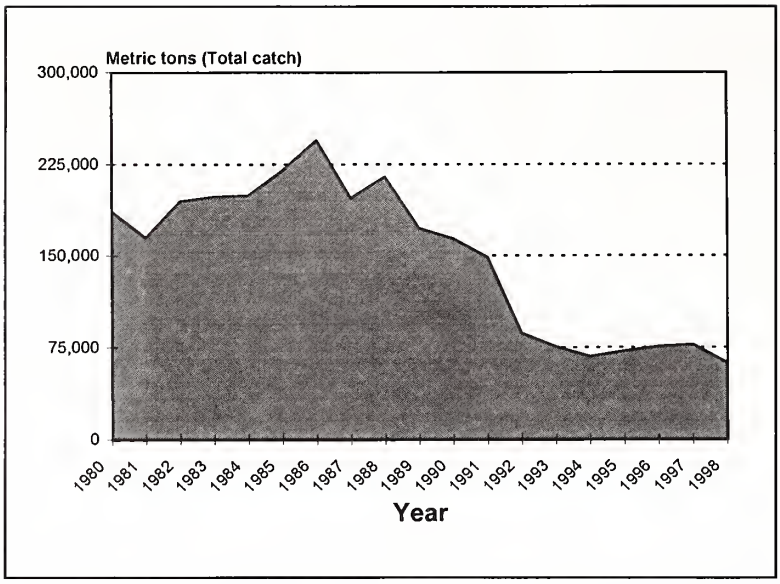

Figure 2.--The Cuban fisheries catch peaked in the 1980s. Once the Soviet oil subsidy was ended, the Cubans had to severely curtail unprofitable distant-water operations, causing catches to plummet.

B. Fishing industry

Cuba is the leading island fishing country in the Caribbean. The country since the 1959 Revolution has given considerable priority to developing its fishing industry. This decision was made soon after Castro's seizure of power as the regime began to take control of the economy. Major investments were made in fisheries, to increase fisheries production. Cuban fishermen had begun reporting increases in the coastal fisheries catch even before the 1959 Revolution. The catch increased from 12,800 metric tons (t) in 1955 to nearly 22,000 t in 1958 (appendix C1a1). The new Revolutionary Government, however, was not just interesting in expanding coastal catches. The Government in the early 1960s proceeded to buy large foreign-built distant-water vessels with scarce hard currency and develop the educational and port infrastructure needed to support a substantial distant-water fishing industry. Cuban planners primarily focused on energy-intensive distant-water operations. Catch increases were reported in the 1960s. Much larger catch increases were reported in the 1970s, primarily as a result of the new distant-water operations (appendix C1a1). The profitability of the Cuban distant-water fishing industry in market terms, however, is questionable. The withdrawal of Soviet subsidies, especially the oil subsidies, forced Cuba to curtail and then virtually eliminate its costly distant-water operations by the mid-1990s (appendix C1a1). Cuba's virtual cessation of distant-water fishing in the 1990s, is strong evidence conforming scattered reports that the operations were not profitable. Clearly distant-water operations could not be sustained without Soviet subsidies. Cuban officials have not yet discarded the interest in distant-water operations, although the continued need to import expensive fuel may eventually force them to do so. Cuban planners in the fisheries sector are giving increasing attention to aquaculture, and reported results in the 1990s have been impressive.

1. Pre-Revolutionary fishing industry (1950s)

The Cuban fishing industry in the 1950s was primarily artisanal, similar to the fisheries of other Caribbean countries. The most advanced sector was a baitboat fishery for skipjack and small tunas which supported a canning industry. Live-bait fishing was introduced by Cubans of Japanese ancestry during the 1940s. This baitboat fishery continues in Cuba today. There was also a shark fishery of some importance which ended in the 1950s because the principal target species, night shark, was overfished. (See: "Bycatch: Sharks") for details. Fisheries had never been an important industry in Cuba, but some considerable advances were made during the 1950s, in both finfish and crustacean fisheries.[32]

Photo 4.--The Revolutionary Government seized control of the fishery cooperatives and sought to improve working conditions. Much of the coastal catch was taken by the cooperatives.

The fishing industry was given more attention during the 1950s than ever before.[33] Some significant increases were reported in the fisheries catch. Working conditions for many fishermen, however, were poor, as was generally the case throughout the Caribbean. The current Cuban Government is fond of describing the Cuban fishing industry before the Revolution. A typical description reads as follows:

> When the history of Cuban fishing up to 1958 is told, the following facts have to be kept in mind: approximately 13,000 very poor fishermen, most of them illiterate, were trying to make a living by fishing in waters along the continental shelf. They were using some 3,000 wooden boats whose average length was between 9 and 12 meters and 70 percent of them were either rowboats or sailboats and 45 percent of them were 10-25 years old. At the same time, some 200 unscrupulous shipowners controlled and exploited one-quarter of all fishing boats, especially the larger, better built ones. And if this were not enough, hosts of "middlemen" and wholesalers took advantage of the poor fishermen whose average income in 1958 was 150 pesos per year.[34]

This assessment, heavily laden as it is with ideological buzz words like "unscrupulous" and "exploited," presents the only historical view permitted in the Cuban media. Indeed this view does contain some accurate information, especially concerning the living standards and working conditions of artisanal fishermen in Cuba. The American media often fails to understand that as depressed as economic conditions are in Cuba today--many Cuban's have in fact benefitted from the Revolution. The Government has unquestionably improved the living and working conditions of Cuban fishermen. The official view that boat owners and seafood dealers are unscrupulous and play no legitimate role in the fishing industry shows an ideological view that explain some of Cuba's economic problems.[35]

These and similar statements often appearing in Cuban publications concerning how the Government has improved the fishing industry include many factual statements. The Cuban Government has made many important advancements in fisheries. The Government does not, however, permit any thorough assessment of its fisheries policy. They consistently ignore other telling facts important to fully assess Cuba's fishing industry. What the current Government does not mention is:

Development: The Cuban fishing industry in the 1950s was expanding and the pre-Revolutionary Government was promoting that development with modest expenditures. The Banco de Fomento Agrícola e Industrial de Cuba (BANFAIC) was created in 1950 and took many important steps in fisheries, such as creating the Asociación de Credito Pesquero and the Centro de Investigaciones Pesqueras (CIP). Profitable commercial fisheries were developing in Cuba during the 1950s and artisanal fishermen were improiving their fishing methods and gear.[36]

Subsidies: The pre-Revolutionary Government did not have to subsidize the country's fishing industry.

Fuel: Fuel did not have to be virtually donated by a foreign power. Larger quantities of costly imported fuel was not used to support unprofitable distant-water operations.

Investments: The pre-Revolutionary Government did not invest millions of dollars of scarce foreign currency in costly, foreign-built fishing vessels which required foreign subsidies to operate.

Availability: Before the Revolution, a wide variety of seafood was available for pesos at reasonable prices and required no Government subsidies. A wide variety of fresh seafood was available to Cuban consumers, including popular species such as snapper, grouper, tuna, shrimp, and lobster as well as the many other species.[37] Cuban consumers from the 1960s to the late 1990s could rarely find fresh seafood available for purchase with pesos and the generally low-quality frozen product occasionally available did not include the more popular species. Thus changed in 1998 when high-quality fresh seafood (including shrimp and lobster) began to appear in fish stores for sale in pesos, although at very high prices.[38]

Also not mentioned by Cuban authorities, because it would yield some unfavorable comparisons, is that other comparable Caribbean countries have also made progress. In fact, many countries with much smaller, but more efficient investments have made more progress than Cuba. The incomes of commercial fishermen and many artisanal fishermen in comparable Latin American and Caribbean countries are in fact substantially higher than in Cuba. In addition, these countries have made economic progress while still utilizing most of the catch to supply the domestic market.

The authors do not minimize the Government's achievements in improving the living and working conditions of artisanal fishermen. Achievements in one area, however, do not replace the need for a non-ideological assessment of the strengths and weaknesses of the pre-Revolutionary Cuban fishing industry and development since the Revolution. Such a pragmatic analysis is needed if the Government's performance is to be realistically studied. The fact that such assessments do not occur publicly in Cuba, is a factor in the dismal performance of the Cuban economy.

2. New fisheries policy (early 1960s)

A modern fishing industry appeared highly desirable to Revolutionary authorities who seized control of Cuba in 1959. A productive, state-controlled fishing industry seemed to offer several economic and political advantages:

Social benefits: The Revolutionary Government desired to improve the living and working conditions of artisanal fishermen, many of whom were very poor. The sailboats still used by many fishermen were replaced by motorized boats, significantly improving working conditions. The fishermen were also provided improved gear. A variety of other programs were initiated which materially improved working conditions.[39] These programs not only provided better working conditions, but built housing that significantly improved living conditions. The social policies pursued by Revolutionary officials, had two important consequences. One, it created support for the Revolution among many previously very poor fishermen. Two, the provision of more modern vessels, significantly increased the industry's fuel consumption.[40]

Food production: A modern commercial fishing industry seemed to offer the means to augment faltering domestic food production. Officials thought that distant-water fishing would offer a cheap way of producing protein.[41] Cuban food production at the time was adversely affected by the increasingly ideologically oriented land seizures and agricultural policies of the Revolutionary Government. Fisheries was in fact first administered as part of National Institute of Agrarian Reform which nationalized large- and medium-sized private land holdings to create state farms and to distribute small plots to landless peasants who were given small plots of land and organized into cooperatives.

Expanded exports: The Revolutionary Government was interested in the economic potential of the fishing industry. The expansion of the fishing industry seem to offer Cuba a way of increasing export earnings to obtain badly needed foreign currency.

Economic engine: Cuban planners saw a modern fishing industry as an economic engine that could support the development of related industries such as ship building and vessel repair, manufacture of gear and equipment, and other activities.[42] The Cubans in the early 1960s were especially interested in industrial development and alternative economic sectors such as tourism were looked down on as an unwanted vestige of American imperialism.

Domestic social control: Nationalizing fishing companies and vessels and taking control of fishery cooperatives enabled the Cuban Government to gain control over the entire profession of fishermen. While only a minuscule part of the population--fishermen were strategically placed. In fact, for an island country fishermen were of special strategic importance. Privately owned fishing vessels offered uncontrolled opportunities to leave and enter the island. Thousands of small craft could be used for espionage, sabotage, escape, and a host of counter revolutionary activities. Thus the Government decided almost immediately after taking power that it was necessary to bring all fishing boats under state control.[43]

Military: The fishing industry offered non-economic benefits such as creating a pool of experienced seamen from which the Cuban Navy could draw. Expanded fishing activity also provided the potential for extending

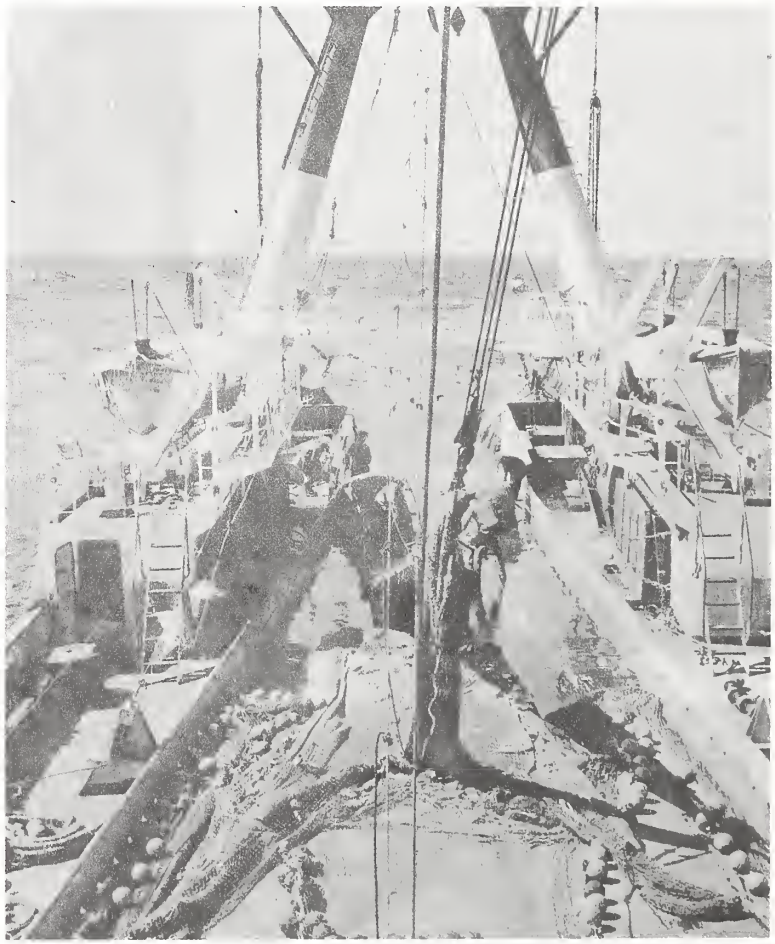

Photo 5.--The Revolutionary Government adopted a new fisheries policy based on the Soviet model of deploying large commercial vessels to conduct fisheries on distant-water grounds.

the country's coastal surveillance capability.

Subversion: Revolutionary officials soon after taking power began to conceive of the idea of exporting the Revolution throughout Latin America. This eventually led to the death of one of Castro's trusted associates--Che Guevara who was killed in Bolivia. There is evidence that as early as 1964 that the Cubans were using fishing boats to support insurgent groups in the Caribbean. Seemingly innocent fishing boats which in the 1960s could generally fish close to foreign coasts could be used to transport revolutionaries, smuggle arms and funds, and conduct intelligence operations. Such operations were reported off Colombia, Guatemala, Mexico, and Venezuela.[44] Operations off other countries also probably occurred.

Diplomatic: Cubans saw a highly mobile distant-water fishing fleet as a way of evading the policy of isolation pursued by the United States beginning in 1960. Fishing vessels could help evade the embargo that the United States imposed in February 1962.[45] The fishing fleet as well as new fleet of merchant vessels could be used to show the flag to friendly governments around the world.[46] The potential sales of fishing vessels and equipment also encouraged U.S. allies to ignore U.S. policies toward Cuba.[47]

The Revolutionary Cuban Government soon began experiencing economic and financial difficulties. The Government seized private companies and began operating them as state enterprises. As a result, production declined. Running a command or planned economy required an enormous state bureaucracy. Government policies, however, were causing, not only the wealthy elite that had owned seized land holdings and companies, but the country's educated middle class to flee the island. The alienated middle class were just the people needed to run the seized companies and state economic agencies. Many of the Revolutionary officials initially placed in control of the seized companies and state agencies were politically reliable, but had little or no business experience or training. The results for the economy were disastrous. Agricultural and industrial production plummeted. Foreign exchange earnings also declined, especially after the United States began instituting economic sanctions in July 1960. Foreign exchange levels reached critical levels and Cuba was forced to reduce imports of many staples.

The Cuban Government began developed a new fisheries policy which began to take shape in 1960.[48] The policy had many non-fishery connotations, including security considerations as well as the social concerns of the Revolution. Other aspects were based on following the socialist, although not always Soviet models.

State companies: The Government began nationalizing fishing companies, at first the assets of Batista supporters and then the assets of others who left Cuba. Fishermen became employees in a state company. Artisanal fishermen were organized in state controlled cooperatives.[49] The cooperatives provided some advantages to the fishermen, but the members had no say in how their catch was marketed and the prices received. The coops were, however, initially a major part of Cuba's fishing industry. A 1967 report indicated that cooperatives had 9,000 members, nearly half of the fishing industry work force of 20,000 persons.[50]

Distant-water fisheries: Cuban officials decided to launch distant-water fisheries both to expand export earnings and to increase food production. This required substantial investments in both vessels and shore facilities as well as training schools to provide needed technicians. Initially officials focused on longlining for export, but then decided purseseining was more efficient. Planers shifted to trawling for high-value demersal species. Eventually the trawl fleet was used to harvest low-value pelagic species with energy intensive mid-water trawls. The constantly changing focus of the Flota Cubana de Pesca (FCP) meant that major investments were made in vessels that proved inefficient or could not be used in the fisheries for which they were designed. The FAC longliners did achieve some export earnings, but to what extent they justified the hard currency investments in foreign-built vessels is highly questionable. The FCP was able to deploy trawlers on some productive grounds, such as

Photo 6.--Cuban fishery officials acquired a fleet of energy-intensive distant-water vessels like the Spanish-built "Manjuari" trawler pictured here.

off Canada where they could target hake and other desirable species. Such catches could generate export sales. Much of the fleet, however, had to be deployed for low-value species such as jack mackerel that, except for some canned product, consumers in few other countries desired.

Marketing: The Cuban Government decided to use much of the coastal catch of valuable species (lobster, shrimp, snapper, and small tunas--skipjack and blackfin) to export for foreign currency. While sugar had long been Cuba's principal export product, fishery products became one of Cuba's leading non-sugar export commodities. It was only in the 1970s, however, that fishery exports began to have a major impact on export earnings. Fishery exports increased from $5 million in 1958 to a high of $146 million in 1986 and 1988 (appendix E1a1). The great bulk of exports has come from coastal fisheries producing lobster and smaller quantities of other shellfish like shrimp (appendix E1a3). In recent years fishery exports have been declining. Shipments have fallen from $101-129 million in 1990 and 1991 to only $98 million (Caribbean Overview, appendix F1b). When inflation is computed this is a notable decline. Some Cubans complain that seafood, especially popular species like shrimp, lobster, and snapper, are unavailable to the general population.[51] Cuban officials say that gourmet seafood is sold for hard currency that is used to "improve the general nutrition of the Cuban people".[52]

Central planning: The Government in 1962 set up the Central Planning Board (JUCEPLAN) and the first 4-year fisheries production plan was introduced. The fishing industry was instructed to "... obtain constant growth in catches to diversify the economy by creating sources of employment and consumption of fish by the population." There was, however, no serious assessment of the potential yield from coastal fisheries. No studies assessing the Maximum Sustainable Yield (MSY) in important fisheries like the shrimp fishery.[53]

Revolutionary Offensive: The Government declared the "Ofensiva Revolucionaria" in 1968. All remaining private businesses and all boats of any size were nationalized. Virtually all fishermen were now salaried workers in a nation-wide state fishing industry.[54]

3. Distant-water operations initiated

Cuba's development of a modern fishing industry was aided by substantial Soviet technical assistance beginning in the mid-1960s.[55] Revolutionary officials accepted the distant-water model of fisheries development as appropriate for Cuba. Not content with fishing around the island in Cuban waters, they proceeded to acquire a high-seas fleet, the Flota Cubana de Pesca (FCP). Cuba ordered large commercial distant-water vessels for FCP from foreign shipyards. The authors know of no serious cost-benefit analysis made as to the advisability of the major investments required to launch a distant-water fishery.[56]

A variety of options for a distant-water fishery were available to Cuban planners:

Soviet model: The Soviet model was primarily to produce low-cost protein for the domestic population. Quality was not a major factor as the Soviet consumer was willing to accept virtually any species and often appalling quality.[57] The trawl methods used were energy intensive. This was feasible for the Soviets because they were a major petroleum producer and until the 1970s, 200-mile EEZs had not yet closed off important coastal fishing grounds. It would be appropriate for Cuba, with little domestic petroleum production, only as long as the Soviets could be convinced to virtually donate the needed fuel and foreign countries continued to permit distant-water fishing.

Japanese approach: The Japanese took a different approach. Their distant-water longline fishery for oceanic pelagics focused on producing very high quality product that could be sold in their very demanding domestic market. The fishery was supported by a sophisticated scientific enterprise which designed and constantly perfected the gear and fish finding process. They also had a extensive marketing system and fishing operations could be adjusted to meet market demands. Cuba had only a minimal scientific infrastructure in the early 1960s and little capacity to support a distant-water fishery. In addition, many experienced businessmen with marketing experience were appalled by the direction of the Revolution and fleeing Cuba.

The Cuban decision to pursue a distant-water fishery were strongly influenced by foreign countries, especially Japan and the Soviet Union. The Japanese influenced the development of the Cuban longline fishery. The Soviets influenced both trawls methods and the overall design of a state-owned fishing company. Spain had a lesser influence, primarily with purseseining methods, but to some extent trawling as well.

Cuba's planning for distant-water operations was poorly done and executed. Officials were according to one observer enamored with "desarrollismo"--an overwhelming commitment to development.[58] They were intent in pursuing foreign models. In the process, officials ignored many basic facts that may have been revealed if a basic economic cost/benefit analysis had

been carried out. Officials made large, costly vessel orders in foreign shipyards and then changed their minds about appropriate fishing methods and strategies. The result was that a large fleet of distant-water vessels was acquired that not only proved unprofitable to operate, but in many cases could not be deployed in the fisheries intended.

Investment: A distant-water fishery required the purchase in foreign shipyards of large, expensive vessels. This meant the commitment of foreign currency which was and continues to be in very short supply. Allocating available funds to distant-water fisheries, which proved unprofitable, meant that other projects of greater potential benefit could not be funded. This misallocation of resources, in particular needs to be examined, when assessing the economic performance of the Cuban fishing industry. Using the proceeds of profitable enterprises to subsidize inefficient programs running large deficits was a common practice in communist countries and is one important factor which impeded real economic growth.

Longline efficiency: The Cubans certainly selected the most efficient longlining operations in the 1960s, the Japanese. Initial trials with Spanish and Japanese longlining were not as productive as they had hoped, but instead of perfecting operations, the FCP decided to place an order for 26 large commercial longliners, the Anchoa class. Rather than ordering the vessels in Japan, they were ordered in Spain--probably because financing was easier to obtain. The new vessels also proved less productive than hoped. Some Cuban captains reported that some of the Japanese longliners performed better than the newer Spanish longliners.[59] The Cubans chose the more expensive alternative of purchasing new longliners rather than the approach of many Korean and Japanese longline companies in which they purchased less expensive used vessels. Compounding the problem, the fishing methods and gear introduced in the mid-1960s was never adjusted and the Cubans continued using it throughout the 1970s and 80s.[60] The authors have noted the same phenomenon in Brazil where Japanese masters hired in the 1960s continued using fishing methods prevalent in the 1960s throughout the 1970s and even 80s and resisted innovations like monofilament line.[61] One Cuban researcher reports that the methods and fishing strategy introduced by the Japanese fishing matters in the 1960s continued to be used by the Cubans without significant change throughout the 1970s and 80s.[62] In that period the Japanese themselves made considerable changes to their fishing operations.

Trawl efficiency[63]: The Cubans by the 1970s appear to have largely given up on longlining, although they continued operating the boats which they already had. Officials were apparently impressed with large Soviet fishing vessels and were seemingly unaware that the Soviet model of distant-water fishing was extremely inefficient. For political reasons, any implied criticism of the Soviet Union, including economic performance, was not permitted in the Cuban media. While Soviet economic data was not released to the public, the inefficiency of the fleet was obvious and would have been revealed with only a cursory assessment.[64] The Soviets needed, for example, a fleet five times larger (in vessel GRT and thus associated operating costs), to produce fish than reported by distant-water fishermen in market economies like Japan (appendix A7). Comparisons with countries operating coastal fishing fleets were even more disadvantageous to the Soviets. Not only were the Soviets extremely inefficient, but much of their catch was low-value species like Alaska pollack or Chilean jack mackerel and, in addition, product quality was often inferior. In effect, the Cubans chose to emulate the most inefficient model possible for their fishing industry and committed significant investment capital to that model.[65]

Fuel: The Soviets could disguise the inefficiency of their operations through low wages and subsidies, especially providing domestically produced fuel to its fleet. Cuba was, and continues to be, however, heavily dependent on imported oil. Many of the vessels ordered by FCP, especially the trawlers, utilized energy intensive fishing methods. Cuban distant-water fishing operations, from the beginning, would be heavily dependent on Soviet oil deliveries at minimal prices. This dependence became even greater in the 1970s when oil prices increased.

Infrastructure: No consideration appears to have been made as to the cost of the needed scientific and marketing establishment needed to support a large distant-water operation. The result was that Cuban longliners never achieved the yields of Japanese and other Asian longliners. Nor did the Cubans modify gear and fishing strategies. They continued using the same gear and methods and focusing on the same species, in part because of the limited scientific resources that could be devoted to the fishery.[66] In addition, they never were able to produce the kind of high-quality product that could be sold at high prices to justify the expense of distant-water longlining.

Access: Longline operations could be conducted on the highseas. Longline operations off Africa could in the 1960s be conducted quite close to the coast as only a few countries had 200-mile zones or the means to enforce them. Access to 200-mile zones could have been helpful, but purchasing licenses would have made operations too costly to pursue.[67] While the longliners could be operated on the highseas, this was less feasible for the trawl fleet. The distant-water trawl operations planned by FCP in the 1970s were primarily off the coasts of other countries--including the United States. Curiously given the political problems with the

United States, the Cubans proceeded with plans to fish off the U.S. coast. At the same time other countries where the Cubans were planning to fish were declaring extended zones designed to exclude foreign fishermen. As a result, by the time that the fleet was built, Cuba encountered great difficulty obtaining access to coastal fishing ground. One opportunity was the Cuban policy of promoting Third World causes and independence movements as well as assisting African countries through programs like providing doctors which created a great deal of good well for Cuba. This never resulted in significant access, in part because many of the countries involved did not have grounds of great interest to the Cubans. One country where the Cubans did want to fish, once independence was achieved, was Namibia--but officials there refused to provide access to Cuban waters when Cuban diplomats suggested the idea. The FAC did, however, gain access to some African fishing ports. (See: "VIII. Ports".)

The decision to create a state-owned fishing fleet was in keeping with the broader Cuban policy of nationalizing private industry. The Instituto Nacional de Pesca (INP), the forerunner of the Ministerio de la Industria Pesquera (MIP), was created to oversee the country's fishing industry. Cuban planners in the 1960s were convinced that the command economic model was a superior economic model to the western free-enterprise system. There was no real assessment by the Cuban authorities of the relative merits of the two systems. Revolutionary leaders simply decided to introduce command economic planning to Cuba. There is a political aspect of command economics in that such systems provide greater state control over the lives of individuals--an element which also appealed to Revolutionary leaders. Many enthusiastic supporters of the Revolution were put in responsible positions because of their political reliability, but without adequate academic training or professional experience. The decision to begin building, what was then seen as, a modern fleet required the support of ranking Cuban leaders as it necessitated the commitment of scarce foreign exchange reserves to import costly, high-seas vessels from foreign shipyards. In this instance, support was readily available because President Castro himself enthusiastically endorsed the idea of building a modern commercial fishing fleet composed of large, foreign-built vessels. At the time, Cuban planners apparently simply assumed that large, modern vessels were synonymous with efficiency. Little regards was given to actual profitability.

4. Distant-water fleets

MIP first organized FCP and then subsequently separated the longlining (primarily tuna operations) from the trawling (mostly groundfish operations). The longline fleet was organized as the Flota Atunera de Cuba (FAC). Officials determined that the trawling and longlining operations were so distinct that they could be best managed as two separate fleets.

a. Flota Cubana de Pesca (FCP)

Cuba's distant-water fishing fleet was acquired in the 1960s and 70s in foreign shipyards. Longliners were some of the first imported commercial vessels acquired by Cuba. The first of these vessels were obtained in 1961-62. The source of the longliners vessels was Japan and Spain. Many of the trawlers subsequently purchased were acquired in Spain, but trawlers were also acquired in other countries, including the Soviet Union and East Germany. Refrigerated cargo vessels were acquired in Italy.[68] The new fishing vessels were primarily trawlers and longliners. The most modern trawlers, the Río Damuji-class stern trawlers, were acquired in Spain during the mid-1970s. While the Soviet vessels were acquired on concessional terms, the vessels ordered in Japan and Spain had to be purchased with hard currency and required a major investment commitment for the cash-strapped Cuban Government.

b. Flota Atunera de Cuba (FAC)

The FAC was formed in 1973-74 as a separate fleet from the existing FCP longline operations. The tuna operations, mostly longlining were considered so distinct from the larger FCP trawl operations that officials concluded a separate management structure would be beneficial. FAC operations were much smaller than the FCP operation in quantities harvested. Longlining operations at their peak accounted for a catch of only about 20,000 t in the early 1970s (appendix C1a2a).[69] The FAC also differed from FCP in that the tuna, swordfish, and related species taken by FAC were exportable products which could be sold on the international market for hard currency. Longlining was Cuba's first major experiment with distant-water fisheries. After making major investments in longline vessels and fleet infrastructure during the 1960s, Cuban officials concluded that longlining was not very profitable and purseseining was a more productive fishing method.[70] Curiously at the time many other countries were reporting very profitable results from their longline operations. Despite the poor productivity and unprofitability of longline operations. Cuba operated a distant-water longline fleet for over 30 years, terminating it only after subsidized Soviet fuel was no longer available. A more detailed discussion of FAC is available in the "VI. Fleet" and "XI. Company" sections of this report.

Photo 7.--The FAC was organized as a separate fleet in 1973-74 and operated primarily in equatorial latitudes, often in the eastern Atlantic off West Africa.

5. Soviet assistance

The Soviet assistance program to Cuba began at modest levels, but was politically of great importance. The first formal cooperative agreement signed with the Soviets was notably for fisheries assistance. Gradually the amounts of assistance increased and economic assistance was added to technical programs. The Soviets began to subsidize the Cuban sugar industry by buying sugar at up to four times the world market prices. The Soviets in addition to a wide range of economic and industrial projects also provided enormous quantities of food to Cuba.[71] The Soviets also began providing oil to Cuba.[72] The value of these oil deliveries in world market terms increased sharply in the 1970s. As the Soviets were providing the oil at subsidized prices, Cuban fishermen had no real incentive to adjust to the oil price increases of the early 1970s as did fishermen in most other countries. The cost of subsidizing Cuba eventually proved very costly to the Soviets. The Cuban relationship did, however, proved valuable to the Soviets in political and strategic terms. In economic terms, however, the Cuban relationship proved more costly than the Soviets had anticipated. Not only were substantial levels of assistance involved, but the Soviets to their surprise found that the Cuban economy needed increasing economic assistance as the years progressed. Soviet assistance and economic models were in many ways making Cuba more, rather than less, dependent on foreign assistance. Ironically, the Cuban need for ever increasing Soviet economic subsidies was in part the Soviets' own doing. The poor performance of the Cuban economy was not only due to Cuban mismanagement, but the result of the inherent inefficiencies of the ideologically based state farms and nationalized industry that the Soviets themselves had helped introduce.[73] The actual extent of Soviet assistance to Cuba is difficult to assess, but it is known to have been enormous. The U.S. State Department estimates Soviet assistance at about $5.6 billion annually.[74] While the long-term impact of this assistance is questionable, it did help to keep the moribund Cuban economy afloat and enabled Cuba to maintain a massive military establishment, beyond that of any other Latin American country.

The Soviets provided extensive fisheries assistance to Cuba, including boats, training, technical aid, port construction, test fishing, fleet support, spare parts, and other aid. (For more details on the Soviet aid program, see "XVI. International".) The Soviets agreed to provide some of Cuba's first highseas fishing vessels, five trawlers, on August 3, 1962. The next month, September 25, 1962, the Soviets agreed to build a modern new fishing port in Havana.[75] A support base in Havana would prove useful to the Russians who in the 1960s were using enormous quantities of fuel because its increasingly wide-flung fleet had no support bases close to the distant ground on which they were fishing. Many countries refused entry to Soviet vessels and others insisted on port fees in hard currency. The Havana port would thus prove very useful.[76] By far the most important element of Soviet aid to the Cuban fishing industry was the deliveries of fuel which allowed the Cubans to conduct distant-water operations.

6. Expanded catch (1960s-80s)

Cuban investments in the fishing industry to acquire a distant-water fishing fleet, and critical Soviet assistance with trawl operations, enabled Cuba to significantly increase the country's fisheries catch (appendix C1a1). The longline fleet made only a minor contribution to the overall fisheries catch. Data on the Cuban catch is readily available to follow the industry's expansion. What is not so readily available is the value of the Cuban catch or the cost of producing that catch. Much of the catch, especially in the 1980s, was low value species (especially jack mackerel) which probably did not justify the high production costs of distant-water operations.

1960s: Cuban catch increases were modest in the early 1960s. Substantial increases were reported in the late 1960s as investment in fisheries, especially, an expanded fleet began to make sizeable contributions. The great bulk of Cuban investment in the 1960s occurred in the mid-part of the decade when a large fleet of large commercial longliners were built in Spain. While they took species of considerable market value, such as yellowfin tuna, the contribution to the overall catch was more limited. The disappointing results achieved with the longliners caused Cuban planners to give increased though to purseseining. The Cubans turned primarily to the Spanish for purseseine technology. The decision was made, however, to focus on trawling because of the larger quantities of fish that can be produced by trawling. While the Soviets had little technical experience to offer Cuba in longline and purseseine fisheries, they had a great deal of knowledge with trawl fisheries. Cuba by 1969 had managed to increase the fisheries catch to nearly 80,000 t from the 22,000 t reported before the Revolution.

1970s: Cuban catches expanded through much of the 1970s. Especially important increases were noted after 1975 when the large Rio Damuji-class stern trawlers began coming into service. These vessels were built in Spain during 1975-79. They were about 3,700 GRT and the acquisition of 26 significantly expanded the fishing power of the Cuban fleet. The catch reached record 213,000 t in 1978. Cuban timing in ordering distant-water vessels proved faulty. The 1970s was a time of fundamental change in world ocean regimes. The United Nations Conference on the Law of the Sea (UNCLOS III) convened in Caracas during 1973. One of the major outcomes was the international acceptance of 200-mile Exclusive Economic Zones (EEZs), in part to manage coastal fishing zones and restrict distant-water fishermen. Several countries declared 200-mile EEZs in 1976-77 and many other countries soon followed. This proved a very adverse development for Cuba because they were fishing off the coasts of several countries declaring 200-mile EEZs. Productive trawling grounds are generally located in coastal waters. As a result, the Cuban fleet encountered increasing difficulties obtaining access to these grounds. Cuban catches declined in 1979 to only 154,000 t, in large part because of the difficulty obtaining access to distant-water trawling grounds (appendix C1a1).

1980s: Catches again were increased during the early 1980s. The Cubans to achieve these catch increases had to radically change their fishing strategy. The Rio Damuji trawlers had been designed to catch valuable demersal species in coastal waters. As the ground where they had expected to deploy the vessels were now closed, the Cubans followed the Soviets to the southeastern Pacific. Here they deployed the Río Damuji trawlers primarily to take jack mackerel with mid-water trawls. The results were impressive in quantitative terms. Overall catches reached a record 245,000 t in 1986, primarily because of massive catches in the southeastern Pacific off Peru and Chile and in other distant-water fisheries (appendix C1a2a). Cuban trawlers have occasionally been observed in other areas of the Pacific, but the authors are unsure as to what fishery operations were involved.[77] Much of the jack mackerel catch in the southeastern Pacific was used to supply domestic markets. Even when meat was not available, Cuban consumers during the 1980s could often find frozen fish, although generally poor quality product, supplied by FCP in domestic markets.[78]

The Cuban fishery off Peru in the southeastern Pacific came in the 1980s to dominate the output of the Cuban fishing industry. Cuban catches in the southeastern Pacific, for example, was 80 percent of the country's distant-water catch and nearly 50 percent of the overall catch (appendix C1a2a). Much of the fish taken, however, was low-value species like jack mackerel. Mid-water trawling for jack mackerel is a costly, energy-intensive operation. Jack mackerel was not a species that FCP had in mind when the ordered the Rio Damuji class trawlers. The Chileans and Peruvians profitably targeted the species for reduction from shore facilities. A distant-water trawl fishery for jack mackerel could not have been profitable if evaluated in market terms. Cuba's disastrous agricultural policies, however, created a great need for additional food supplies. This was especially true of high protein foods like fish-even for species that were not highly prized. As there was no foreign market for jack mackerel, most of the catch was distributed in Cuba. The actual production costs of the jack mackerel produced is unknown, but given the cost of distant-water operations, it is likely to have far exceeded the value of the fish produced.[79] The

Soviets provided fuel as part of its assistance program.[80] Only the deliveries of Soviet fuel made the Cuban fishery in the southeastern Pacific off Peru possible. Once the Soviets began cutting back on subsidized fuel deliveries, the Cuban fishery in the southeastern Pacific had to be curtailed and finally ended (appendices C1a2a-b). The unpopularity in Peru of providing access to the Cuban and other foreign fishing fleets was another factor affecting fleet operations.[81]

The scale of the Cuban operations impressed many. Substantial quantities of fish were being caught. The new foreign-built fleet looked impressive. The Cuban media often triumphantly published statistics showing the huge catch increases that FCP was reporting, but not the deficits being incurred. One assessment of the Cuban distant-water fleet during this period states that Cuba's distant-water fleet was an "impressive accomplishment" and was "...characterized by a level of technical sophistication and capacity unrivaled in the Caribbean and Central America region."[82] Foreign observers were also often impressed with the results and often fawning articles appeared in fishery journals around the world.[83] Left unsaid in most glowing descriptions of Cuban fisheries, however, was any assessment of the profitability of the Cuban fishing industry. It is now clear that the distant-water operations, FAC and FCP were unprofitable in real economic terms and required significant state subsidies.[84] Such subsidies were possible because of the highly profitable lobster fishery.[85] The Soviets provided further subsidies in the form of low-cost fuel. Thus rather than providing a real economic return to the Cuban economy, these operations required funding from profitable Government operations and Cuba's Soviet ally to conduct operations.

The difficulties Cuba experienced in obtaining access for its distant-water fleet caused officials to give increased attention to coastal fisheries. A new system planning system similar to the Soviet system was introduced in 1976. State enterprises were required to have a profit goal--a novel concept in Cuba at the time. Performance was then measured against that goal. Few if any enterprises, however, were closed because they were not profitable. The system was based on long-term projections, 15-20 years. An annual plan for the whole economy was prepared for the entire national economy in consultation with each ministry. One Cuban observer explains that the resulting plans "... were sent to the specialists in each ministry to discuss the feasibility and a yearly national plan was presented to the leadership of the Cuban Communist Party and the National Assembly for its ratification as a law for the coming year. Once in place, they were hard to change, and ad hoc adjustments were thought to defeat the whole purpose of a planned economy."[86] This process required much better knowledge of coastal stocks and greater support was given to the CIP to establish MSY levels. Many Cuban fishery managers came to feel that they were "trapped by the plan".

7. Special Period (early 1990s)

The economic inefficiencies of the Soviet Union were becoming increasingly apparent in the 1980s. The Soviets had great difficulties meeting their increasingly expensive commitments to Cuba. As a result, Cuba's Soviet allies began reducing assistance in the late 1980s, especially cutting back on fuel deliveries.[87] Soviet Premier Mikhail Gorbachev personally visited President Castro during April 1989 to discuss necessary reductions in assistance. Given the importance and dimensions of the Soviet aid, the eonsequences for Cuba were immense. As the Soviet Union disintegrated into economic chaos in the late 1980s, assistance to Cuba plummeted.

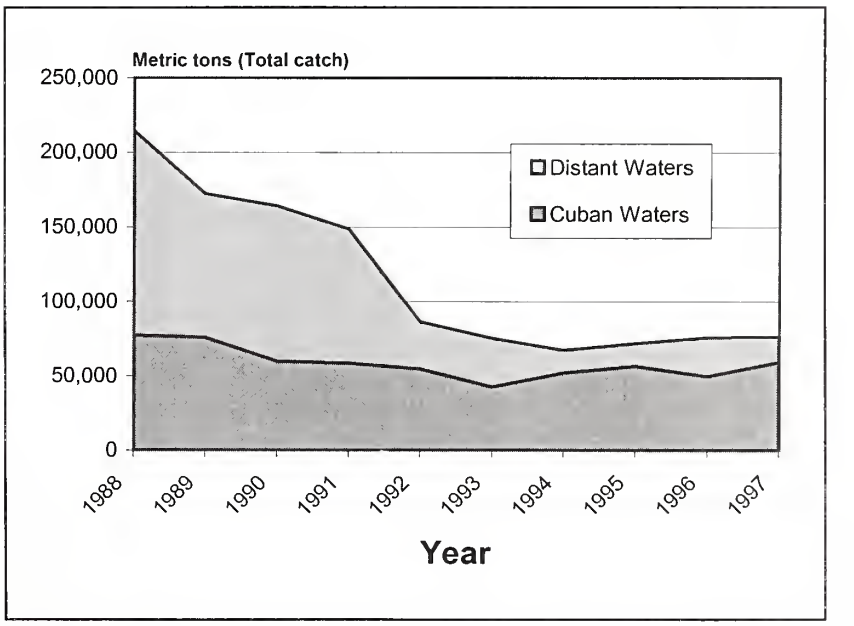

Figure 3.--The Cuban fisheries catch peaked in the 1980s. Once the Soviet oil subsidy was ended, the Cubans had to severely curtail unprofitable distant-water operations, causing catches to plummet.

Photo 8.--Fuel problems became increasingly difficult in the 1980s. Here personnel of FLOCUBA swear as a group to commit themselves to fuel economy measures requested by President Castro.

Cuba during the early 1990s faced the termination of major economic support programs. The termination of either one would have been a major blow, together the end of these programs posed an enormous problem for the weak Cuban economy.

Subsidy: The Soviet subsidy provided enormous support for the Cuban economy. The failing Soviet Economy, however, could simply not support the commitments made to Cuba. This was the case even before the Soviet Union was dissolved at the end of 1991. The fall of communism in Russia removed even the ideological desire on the part of most Russians to support communism in Cuba.

Trade: The great bulk of Cuba's trade during the 1980s was with the Soviet Union and Eastern European communist countries. The Soviets had encouraged its Eastern European client states to trade with Cuba, in part to lessen the strain on the Soviet economy of supporting Cuba. The new democratic governments which came to power in Eastern Europe, however, had no interest in subsidizing a communist government in Cuba.

Deprived of its primary support and trading partners, the Cuban economy was soon beset by serious shortages of nearly everything. The fall of communist regimes in Eastern Europe beginning in 1989 meant the virtual cessation of trade with several important trade partners. These new democratic countries faced enormous problems in the transition from communism and the governments had no desire to use their scarce resources to support a communist government in Cuba. Soviet officials in 1990 demanded that trade, including oil deliveries, beginning in 1991 be based on convertible currency and world market prices. It was the dissolution of the Soviet Union at the end of 1991, however, that made it clear to the Cubans that the economic consequences would not be a short-term phenomenon. There were enormous dislocations in the Cuban economy. Rationing became even more stringent.[88]

The enormity of Soviet and Eastern European support to Cuba meant that when it was terminated, Cuba had to make major adjustments. The immediate impact was a recession in which national production may have declined about 35 percent or more from 1989-1993.[89] Cubans refer to this as the "Período Especial en Tiempo de Paz" (Special Period in Peace Time). The Cuban Government was forced to introduce important economic reforms, which had major consequences for the fishing industry. Many of these changes were market reforms and were to prove unwelcome to many Cuban officials now steeped in the doctrines of Marx and Lenin. Ironically, while the changes were forced upon Cuba, the outcome may eventually prove to be an economy that is stronger and more productive than when Soviet subsidies allowed the continued operation of inefficient enterprises.

8. Painful adjustments and new policies

The fishing industry may have been one of the sectors most affected by the withdrawal of Soviet support. Most of the Cuban catch in the late 1980s was being produced in distant-water fisheries (appendix C1a2a). Low-cost fuel was essential for conducting these unprofitable distant-water fisheries. Cuba on its own could simply not afford fuel purchases on the international market to sustain its distant-water operations. The Cubans were in essence fishing some of the world's least valuable fish with the most expensive fishing operations imaginable.

Distant-water operations: Distant-water operations inherently consume larger quantities of fuel than coastal operations. This is a function of operating fishing vessels at greater distances from the home market and supply and support bases. There are a variety of expenses making distant-water operations more expensive, including increased fuel consumption, crew exchanges, foreign port costs, transporting catch, and several other factors.

Methods: Most of the Cuban distant-water catch was taken by trawlers. Trawling is the most energy intensive fishing method. In addition, the Cubans were often not trawling on shallow shelf, but at some depths

using mid-water techniques which consume especially large quantities of fuel.

Vessels: The Cubans were using expensive foreign-built vessels. When constructed in the 1960s and 70s, fuel efficiency was not a high priority because the Soviets supplied subsidized fuel. The Cuban fleet by the late 1980s was aging and thus were becoming increasingly more fuel inefficient. The Cubans kept and operated their longliners for a much longer period than other important fishing countries like Japan, Korea, and Taiwan.[90] While not particularly fuel efficient to begin with when new in the mid-1960s, by the 1980s they were increasing expensive to maintain and operate.

Prices: There seemed to be little relationship between the prices at which product was sold for and real production costs. This was a problem identified by FAO advisers as early as the 1960s.[91] It was still uncorrected by the late 1980s. One observer reports that the problem has continued into the 1990s.[92]

Maintenance: The aging fleet was proving increasingly costly to maintain.

Access: The increasing acceptance and more aggressive enforcement of coastal EEZs limited potential grounds for the Cuban distant-water fleet. Cuba was unable to obtain needed access from most coastal countries to the productive ground they had hoped to target. The Cubans were thus forced to deploy their vessels on less productive grounds.

Target species: Cuba was unable to obtain allocations for high-value ground fish and thus had to deploy its fleet for low-value species like jack mackerel. Thus much of the catch could not be exported.

The fuel problem was already serious by the mid-1980s because the Soviets began to have difficulty meeting planned fuel deliveries. In addition, price increases since the 1960s had made the Soviet fuel commitments a major financial undertaking. The Cubans, as a result of the cut backs, had to restrict deliveries to the fishing industry. The Cuban Communist Party organized meetings in every work center in the country. These meetings held in FCP and FAC facilities were particularly important because of the quantities of fuel consumed. The meetings were given considerable publicity. President Castro and other ranking officials personally participated in some of these meetings. Reducing fuel consumption was made to be a personal patriotic duty.[93] As a result, FCP employees were physically lined up and had to raise their hands and swear that they would comply. Despite strenuous Cuban efforts to economize on fuel, fleet operations were hampered by fuel shortages.[94]

There was in fact only so much FCP, FAC, and other fleet managers could do. The age of the vessels and the engines meant that possible fuel economies were limited. For the most part the engines were not built with fuel economies in mind. Overhauling the engines more regularly would have helped, but this would meant more up-front costs. Other countries faced similar problems, but in most cases the impact was more gradual because they never had access to subsidized fuel and were not insulated from price increases. Their fleets were thus more diversified. Many owners who had to personally buy fuel had demanded greater fuel economy. According to former Cuban official, "This adaptability did not exist for a fleet operated under a centralized system, in which the captains have little independent authority."[95]

The entire Cuban economy was affected by the fuel shortage. President Castro explained that 7 million t of imported oil were required for the Cuban economy to be functional. Cuba was only able to obtain about 6 million t from Russia in 1992. And 1993 imports were expected to be only a fraction of the quantity received in 1992.[96] The Government demanded further energy conservation measures in all agricultural and industrial enterprises. Blackouts in Havana and other cities were common. The Government launched major energy conservation programs. Farmers were ordered to expand the use of oxen. Commuters were encouraged to ride bicycles which were imported in large numbers from China.[97] The Government was forced to reassess its energy policy and how fuel was used and allocated. How efficiently fuel is now utilized in Cuba is an open question. MIP claims major improvements in fuel efficiency (appendix C1b). Clearly some inefficient, unprofitable operations have been terminated and whole companies have been closed.

The fishing industry was one of the sectors most severely impacted by the fuel shortage because of the quantities of fuel needed for fishing operations. Both the distant-water and coastal fisheries were affected, but the most dramatic impact was on the energy-intensive distant-water fleet.

Distant-water operations severely curtailed: The major difficulty faced by FCP and FAC during the 1990s was the fuel shortage in Cuba. When the Soviets sharply cut back on oil deliveries, Cuba could meet the massive fuel requirements for its inefficient distant-water operations. FCP primarily supplied domestic markets and generated little hard currency on its own to fund fuel purchases. Cuban observers report that the fuel shortage combined with the elevated fuel consumption rates of Cuba's aging fleet is the major reason that FCP and subsequently FAC had to terminate almost all of their distant-water operations.[98] Cuba simply could not afford to buy fuel at international prices. The major reduction in FCP

operations has caused severe fish shortages in the Cuban domestic market, further worsening the deplorable domestic food situation. There was a similar impact on FAC, although a few longliners continued to operate through 1996.

Coastal fisheries: The conservation program affected the coastal fishing industry and fishermen who also had to reduce consumption. In may cases this meant reducing fishing effort. One report rather far-fetched report indicated that half of the bonito fleet, for example, was being converted to sail power. Cuban officials claimed that they have already tested the feasibility of such operations. Of course it was not feasible given the fact that many vessels were heavy ferro-cement boats over 15-m in length.

The impact of the difficulties encountered in distant-water fisheries is clearly evident in Cuban fisheries catch and export data.

Catch: The Cuban distant-water catch declined from about 150,000 t in 1986 to only 15,000 t in 1994 (appendices C1a2a-b). During this period the coastal catch, except, for 1993 when effort was affected because fuel was simply not available, remained relatively stable. This was primarily because many of the coastal fisheries, especially the lobster fishery, generated export revenue. The lobster fishery uses small boats with limited displacements requiring modest amounts of fuel while producing very high value product. One exception was the baitboat fishery for skipjack and other small tunas which required larger amounts of fuel to produce lower value product.[99] This fishery declined sharply in 1993 and subsequently never fully recovered (appendix C9a). The authors notes another especially large in 1999 suggesting that Cuban authorities may be phasing this fishery out.

Exports: The sharp decline in fishery exports during 1993 is one clear impact of the fuel crisis (appendix E1a1). While 1993 experienced the most dramatic impact, reported fishery exports for the 1990s as a whole have also declined. Assessing exports, however, is more complicated, however, and must take in account domestic dollar sales "exportación en frontera". Such calculations would not show the sharp declines apparent in the traditional export data.

The dissolution of the Soviet Union and the end of once massive Soviet subsidies forced the Cuban Government, including fishing companies, to institute economic reforms far beyond reducing fuel consumption. These reforms included permitting farmer's markets and insisting that state corporations operate profitably. The fishing industry has not been permitted to participate in all of these reforms. While agricultural produce can be sold in free markets, fish cannot be sold by individuals in Cuba. Fishermen have to sell their catch to a single state agency--ACEPEX. Other reforms, however, have been applied to the fishing industry.

Bonuses: The question of how to compensate workers has been and continues to be a controversial question in Cuba. State companies, including fishing enterprises, paid salaries and offered financial bonuses for superior performance. This system had been introduced in the 1970s.[100] The bonuses were often more important than the salaries.[101] Government officials, however, now describe this system as a "complicated and generally ineffective incentive system".[102]

Earnings share: More recently Cuba has moved away from the bonuses which were offered when the captain and crews were paid formal salaries. With the shift to producer associations, most Cuban fishermen no longer receive actual salaries.[103] A Cuban source reports in 2000 that Cuban fishing vessels are still assigned production quotas or catch minimums. The value of their catch is based on an annual price established by Ministerio de la Industria Pesquera (MIP) and "the industry".[104] The major difference is that the fishermen on each vessel sell their production to ACEPEX and expenses are charged against the revenue earned. The net income is returned by the producer association to the captain who then distributes it to the crew. The shares distributed vary among different fisheries and the captains reportedly have considerable discretion. The shares are paid in pesos (80 percent) and dollars (20 percent). Repair and maintenance costs are the responsibility of the association.[105]

Photo 9.--Cuba's fleet of distant-water trawlers and longliners were mostly decommissioned in the 1990s. The refrigerated transport vessels could be used for other cargo.

Investment process: The MIP Comisión de Desarrollo in 1988-89 made an assessment of distant-water fisheries, even before the 1993 fuel crisis. The Comisión concluded that further investments should not be made in distant-water fleets, but rather greater attention should be given to aquaculture. Officials concluded that the potential profits from as investment in new longliners was not justified.[106] MIP units were asked to study the investment process so that allocated funds could be better utilized.[107]

Other factors beyond the fuel crisis forced major changes in the fishing industry. Cuban managers never had to seriously consider costs and accounting were generally minimal. State enterprises in Cuba have now been instructed to begin operating profitably. President Castro in fact even made speeches insisting that managers bear costs in mind, sounding increasingly like a fiscally conservative chief financial officer of a large corporation. These directives applied to Cuba's state fishing companies. In fact they especially affected fishing companies because of the large quantities of fuel consumed.

Cuban fishery officials developed new policies to adjust to the economic realities of operating without massive Soviet subsidies, especially limited fuel supplies. Cuban fishery officials took the following steps:

Curtail distant-water fisheries: Cuban officials drastically curtailed distant-water fisheries which consumed much of the fuel formerly allocated to the fishing industry. Most of FCP's distant-water operations that produced low-value fish for the domestic market were sharply curtailed in 1992 and suspended in 1993, except for operations in the northwestern Atlantic off Canada.[108] FCP deployed 12 trawlers off Canada from March to September, 1993, but the rest of its large vessels were idled in port, primarily Havana.[109] All of FAC's operations ceased in 1996. The reduction of FCP's operations significantly reduced domestic fish supplies. Cuban officials have, however, not entirely abandoned distant-water operations. Press reports suggest that some new trawlers, but no new longliners, have been purchased. (See "12. Current situation" below.)

Continue coastal fisheries: The country is continuing its coastal fisheries that generate export earnings. The Government has, however, developed new compensation guidelines designed to motivate the members of the Asociaciones Pesqueras Provinciales (APPs) that now harvest much of the coastal catch, including at least some payments in dollars.

Improve efficiency: MIP took a variety of steps to improve the efficiency, and thus profitability, of the fishing industry. Enterprises which had only primitive accounting systems and had engaged in a virtual barter economy were required to adopt new accounting systems, and more importantly--operate profitably. Fishing operations and financial management were decentralized. Even so, the fishing industry remains centrally controlled. Individual Asociaciones Pesqueras Provinciales (APPs) and companies have to sell their catch to one state agency at set prices.

Expand aquaculture: MIP has give considerable attention to aquaculture. Shrimp culture operations have provided some export income and expanding farm harvests of finfish have partially replaced the huge decline of the distant-water catches (appendix C1a2b). (See "14. Aquaculture" below.)

9. Catch declines

The Cuban fisheries catch in 1986 began a steady decline. The catch declined from a peak of 244,000 t in 1986 to only 67,000 t in 1994. This primarily reflected difficulties associated with reduced Soviet oil deliveries. Other problems such as increasing difficulties obtaining access to the EEZs of other countries were also encountered. Poor management practices were another serious problem, especially inflexible centralized control which one Cuban source describes as "dirigismo" or excessive centralized control. He explains, "There was an operational failure of an economic activity already in difficulty. Authorities in Havana managed by radio communications and were thus not fully aware of the situation at sea. Officials simply did not adapt to changing conditions."[110]

Cuba reported substantial catch declines in 1987, 1989, 1991, and 1992. Fishing effort reported by FCP dropped from 5,800 vessel days in 1985 to only 3,500-3,600 vessel days in 1989 and 1990.[111] The Cuban catch by 1992 totaled only 86,000 t, less than half of the 1986 catch. Most of this decline has come in Cuba's distant-water fisheries. The distant-water catches which had once approached 150,000 t (1986), declined to a mere 8,000 t (1998) (appendix C1a2b). FCP by 1993 was only operating off Canada.[112] Minor operations by FAC off West Africa continued until 1997. The Cubans deployed trawlers off Canada in the northwestern Atlantic during 1997-98, but did not fish in the other distant-water areas where they had previously operated. The only continuing Cuban distant-water fishery is conducted in the north-west Atlantic where the Canadians supply a small quota of groundfish. The overall Cuban fisheries catch in 1998 was only 62,000 t, the lowest level since 1966 (appendix C1a1). A modest increase to 67,000 t was reported in 1999.

Photo 10.--Many Cuban small and large distant-water trawlers by 1993 were tied up idle in Havana harbor.

Without the Soviet fuel subsidy, FCP had to idle its aging fleet. FCP has already withdrawn from most of its distant-water grounds: the southeastern and southwestern Atlantic and the southeastern Pacific. Canada is continuing its allocations to Cuba, but the Canadian Government may find such allocations increasingly difficult to justify to the country's own hard-pressed fishermen. Namibia is reportedly considering the reopening of its coastal waters, but it is unclear if Cuba can benefit from its close relationship with Namibian officials. (See: XVI. International.) Even if FCP could secure access rights, they would be unlikely to renew extensive distant-water operations. Diesel fuel supplies are so limited in Cuba that state companies, like FCP, that do not produce exportable products faces serious obstacles in qualifying for fuel allocations.

10. Disposition of old vessels

The Cuban Government during the early 1990s was forced to tie up most its aging fleet of distant-water vessels. Most were eventually scrapped.[113] This meant both FCP's trawlers and FAC's longliners. The Cubans attempted to sell the vessels. Given the age of the idled vessels and their specialized design, the Cubans apparently had difficulty finding buyers other than for scrap. One report suggests that some distant-water trawlers were converted to cargo vessels.[114] MIP apparently studied the possibility of converting some of the longliners into refrigerated transports, but we do not know if any actual conversions took place.[115] A few trawlers appear to be still active and deployed in the northwestern Atlantic off Canada (appendix C1a2b). Reports from Bermuda indicate that one longliner was involved in a joint venture during 1998-99. FCP's and FAC's idled vessels are too large to be deployed profitably in Cuban coastal waters. FCP's fleet is now quite old. Most of the *Río Damuji* class vessels, the most modern in the Cuban fleet, were built in the mid-1970s and now are 20-25 years old. The FAC Japanese and Spanish-built longliners are even older. Given the size of the vessels and design, there are few alternative uses. Some of the vessels may have been scraped. The authors do not have, however, any details on the actual disposition of the fleet.

11. Coastal fisheries

Cuban coastal fisheries have experienced a high rate of growth from the mid-1950s through the 1970s. The Cuban Government gave priority to the development of a distant-water fishing fleet, but also addressed coastal fisheries as well. Efforts were made to expanding fishing effort by building better boats as well as improving the gear and equipment available to the coastal fishermen. The rate of growth slowed in the 1980s and some important fisheries experienced declines in the 1990s. A Cuban analysis of coastal fisheries published in 1995 found that Cuban coastal resources were being heavily utilized. The CIP reported the following status for the 21 most important fisheries:

Senescent (declining): 39 percent of resources.
Mature: 49 percent of resources
Developmental: 12 percent of resources.
Undeveloped: No resources.[116]

Cuban researchers believe that while overfishing is a major reason for the decline in some fisheries, it is not the only reason. The extensive and indiscriminate use of set nets is one problem as well as the construction of dams in the main rivers.[117]

Heavy utilization of fishery resources is not something unique to Cuba. An examination of U.S. and European fisheries would in fact show a similar, if not more discouraging pattern.[118] Some observers believe, in contrast to the deficit-plagued distant-water fishery, that Cuba has done a better job of managing its coastal resources.[119]

12. Current situation

The Cuban fishing industry has changed dramatically since the late-1980s. Cuba which once derived half of its fisheries catch from distant-water grounds is no longer an important distant-water fishing

country. The major contributing factor has been the economic problems faced by the Soviets and the eventual break up of the Soviet Union at the end of 1991. The greatest impact was on Cuba's distant-water fishing operations described above, but the entire industry has been affected.

Improving economic conditions in Cuba appear to have enabled the fishing industry to stabilize its operations. Problems continue and fuel shortages still affect industrial production and fishery operations.[120] Conditions are, however, substantially improved from the first year after the Soviet fuel subsidy was terminated. Seafood production if not catches have been stabilized. Catches have continued to decline somewhat, but the large declines reported during the late 1980s and early 90s are no longer occurring--primarily because the distant-water catch is now minimal. Catches since 1993 have ranged from 62,000 t (1998) to 76,000 t (1996).

The decline in the capture fisheries catch during the 1990s has, in part, been substituted with cultured harvests which totaled 46,000 t in 1997 (appendix C1a2b). A decline in the cultured harvest to 38,000 t was reported in 1998, but this still constitutes 40 percent of Cuban fisheries production. As a result, Cuba has maintained overall fisheries production above 100,000 t since 1986 (appendix C1a2b). Cuban newspaper articles have reported large increases in the fisheries catch during 1998 and 1999. *Granma* reported a 1999 catch of 165,000 tons.[121] The authors, however, have not yet been able to confirm those increases and believe them to be highly unlikely.[122] Fisheries Minister Orlando Rodriguez Romay reports that all sectors of the industry reported expanded production and improvements in quality. He said that in 2000 that Cuba will focus on expanding shrimp harvests and will produce 8,000 t for export.[123]

While Cuban officials appear to have stabilized production, the supply of seafood in Cuba continues to be grossly insufficient to satisfy domestic demand. Officials report that despite increases in the late 1990s, demand continues to exceed supply.[124] Overall production is still less than half of the 200,000-240,000 t that was reported in the late 1980s (appendix C1a2a). Substantial quantities of seafood, especially the most popular species, are exported or sold in domestic dollar stores.

Cuba's domestic market has changed significantly in the 1990s, especially since the economic reforms allowing Cubans to hold U.S. dollars. Some high-quality seafood is now available in the Government's dollar stores, although prices are quite expensive in local terms.[125] Seafood is occasionally available in the many small private restaurants ("paladares") that are now thriving, but such sales are illegal and not common. It is unclear how this seafood is entering private channels. The sale of even small quantities of high-quality seafood, which is mostly reserved for export, while illegal can be very lucrative for the individuals involved. Small dollar earnings can potentially generate much more income than virtually any salary. Some of it appears to be illegal diversions from the state fishing companies or unauthorized fishing. Cuba officials speak of the need for "order and discipline" in the fishing industry.[126] The Cuban media reports occasional arrests. One group of Santa Clara fishermen were arrested with 17 t of lobster and fish they hoped to sell in Havana and the tourist resort at Varadero. One provincial official reports confiscating 34 fishing boats of various sizes.[127] MIP reports that nationwide it continues to have difficulties with illegal operations and 3,000 people were fined 4.7 million pesos for various infractions during the first half of 1997.[128] One of the principal infractions was selling seafood.

Photo 11.--Cuba heavily fishes its coastal resources, but these small-scale operations have proven profitable in contrast to the deficit-ridden distant-water operations.

Economic conditions currently appear to be improving in Cuba as the country adjusts to the termination of the massive Soviet subsidies and modest reforms stimulate economic activity. Officials report that the fishing industry, like other sectors of the economy, are reporting

improved results.

1992: The Soviet Union was dissolved at the end of 1991 and with it the subsidies provided by the Soviets. Without the fuel subsidy Cuba could not support the distant-water fishery in the southeastern Pacific. As a result the fisheries catch fell from nearly 150,000 t in 1991 to only 87,000 t in 1992 (appendix C1a2b). As most of the catch in the southeastern Pacific was used for domestic markets, the supply of fish in Cuba plummeted.

1993: The fisheries catch fell further to only 76,000 t in 1993. The only distant-water trawling was reported off Canada, the rest of Cuba's large distant-water vessels were idled in port, primarily Havana.[129] Limited FAC operations continued off West Africa.

1994: Domestic fish supplies reached the lowest point since the 1960s. The catch declined to 67,000 t (appendix C1a2b).

1995: Seafood supplies were little changed in 1995, although a small catch increase was reported to 72,000 t (appendix C1a2b). Cuban sources reported that aquaculture harvests brought in about 95,000 tons.[130] Cuba had a small aquaculture industry which for many years had been producing from 19,000-24,000 t of fish and shellfish annually.

1996: Cuba reported a small increase in the fisheries catch and more importantly increased cultured harvests of 34,000 tons. This brought overall production up to 110,000 t, the highest level since 1991 (appendix C1a2b). FAC reported a 2,000 t catch off West Africa before ceasing operations.

1997: Cuban press reports in 1997 revealed that fishermen were having a good year. Actual catches were actually little changed at 77,000 t, but aquaculture operations reported record harvests of 46,000 t, bringing overall output to 124,000 t (appendix C1a2b).[131] While the capture fishery catches were far less than catches during the 1980s, they appear to constitute production from less heavily subsidized fisheries. The Fisheries Ministry, which operates fishing fleets and processing plants, reported increased earnings of 35 million pesos[132] for the first 6 months of 1997--a 10 percent increase over the same period of 1996. Fisheries Minister Orlando Rodriguez Romay claims that the Ministry has achieved significant accounting efficiencies.[133]

1998: Seafood production declined across the board in 1998. Catches around the island were about 50,000 t (appendix C1a2b1). Catches were reportedly limited because of climatic factors. The sole remaining distant-water fishery was in the northwest Atlantic where the Canadians provided a small groundfish quota. This fishery fell below 8,000 tons. In addition, cultured harvests declined to only 38,000 t (appendix C1a2b). Officials attempted to pursue potential joint ventures. One with a Bermuda company involving a longliner did not prove successful, primarily because much of the catch delivered was shark for which the Bermuda company had no market.[134]

1999: Cuban newspaper reports indicated a very large catch increase of 165,000 tons.[135] The authors do not consider this estimate to be creditable. Notably the Cuban journalist who prepared the reported calculated that this was a 7 percent increase over 1998. This would mean based on available data on 1998 that the 1999 output (capture fisheries and aquaculture) was about 107,000 tons. This would seem a more reasonable estimate. MIP has reported large catch increases and expanded deliveries to the domestic market during 1995-99 (appendix C1b). Fisheries Minister Rodriguez Romay reports that all sectors of the industry grew in quantity and quality, achieving significant improvement in economic efficiency.[136] FAO reports that the coastal catch was about 50,000 t, which was supplemented with some distant-water catch (appendix C1a2b2). While the catch off Canada declined, some operations were reported in the south Atlantic. Combined with strong aquaculture harvests, production exceeded 120,000 t in 1999.[137] Officials reported that seafood exports increased from $84 million in 1998 to $110 million in 1999.[138] Press reports suggest that new trawlers were delivered to Cuba for renewed distant-water operations in 1999. (See "13. Future distant-water operations" below.) In addition, one of FCP's Río Damuji trawlers, the *Río Cuyaguateje*, was deployed for the first time in the north Atlantic shrimp fishery where it fished under a North Atlantic Fishing Organization (NAFO) quota. The vessel required some "technical improvements" in St. John's, Canada, including the installation of "modern equipment" before it could begin fishing.[139]

2000: No information available on 2000 catches. Press reports suggest some renewed distant-water activity. (See "13. Future distant-water activities" below.)

Foreign trade statistics show some interesting trends.

Exports: Cuban seafood exports have declined somewhat during the 1990s. Shipments in 1998 totaled $98 million, slightly below the $101 million reported in 1990 (appendix E1a1). A further decline to $93 million was reported in 1999. This would actually represent a substantial decline if inflation was calculated. However, greater quantities of high-quality seafood were sold in Cuban Government-operated dollar stores during 1998 than in 1990 and in 1998 sales of high-quality seafood began in peso stores, although at very high prices. Such sales are for all intents and purposes exports within the country. As a result, assessing fishery export trends becomes quite complex. Variations from year to year, such as record

shipments of $130 million in 1996 largely represent fluctuations in the lobster fishery. Notably the cutbacks in FCP did not significantly affect export earnings because so much of the catch was marketed domestically. The closing of FAC, however, apparently did affect fish exports which declined from $4.1 million in 1995 to only $0.8 million in 1997.[140]

Imports: Fishery imports declined from $36 million in 1990 to only $12 million in 1992 because the Government had difficulty financing foreign purchases. Since then imports have increased to $24 million in 1998 (Caribbean Overview, appendix F1a). Most of the imports in recent years have been frozen fish. Significant imports of canned fish were reported in 1998, the first time in several years.[141] The canned fish appear to have been primarily Chilean product, mostly inexpensive mackerel and sardine packs.[142] Imports in 1999 were $22 million, only a little less than in 1998, but for the first time were mostly canned product.

13. Future distant-water operations

Press reports suggest that FCP is interested in purchasing used replacement vessels, but this has been complicated by the country's inability to finance foreign purchases. The increasing demands that coastal countries are making for access and the cost of distant-water operations, especially fuel prices increases, will limit Cuba's ability to resume major distant-water operations at the level conducted in the 1980s.

A variety of reports suggest that Cuba continues to be interested in distant-water fishing. One press report, for example, suggested that the Cubans in 1992 were considering the purchase of used Spanish trawlers displaced from the Namibian fishery, but the purchase was never consummated.[143] The very significant commitment that Cuba made in the 1960s and 70s to building the infrastructure needed for a distant-water fishery has probably influenced many officials.

Scattered press reports indicate that Cuba's focus on acquiring modern distant-water vessels is primarily on trawlers.

Trawlers: Cuban sources report that European companies in 1998 and 1999 suggested several joint ventures using Cuba's distant-water trawlers. Cuba is reportedly considering the renovation of some of the trawlers in European shipyards and increasing the freezing capacity to 100-120 t per day.[144] Press reports in 1999 indicate that Spain under a $170 million agreement has delivered 5 new factory trawlers and 10 reconverted stern trawlers to Cuba. The 5 new vessels are being deployed off Canada and the 10 reconverted vessels off Mauritania and other West African countries.[145] Cuba did begin reporting small catches in the southeastern and southwestern Atlantic during 1999 (appendix C1a2b2). Other press reports in 2000 indicate that renovated Rio Damuji-class trawlers are operating in the hake fishery off Canada, the shrimp fishery on the Flemish Cap in association with the Norwegian company Sjovik, and the pelagic fishery off western Africa.[146] The Cubans will be participating in the north Atlantic shrimp fishery for the first time in 1999-2000. The vessel is operated by Dragnets, the PESPORT fishing company.[147] (See: "XI. Companies" below)

Purseseiners: Discussions with Chinese officials about acquiring purseseiners were reported in 1998.[148]

Longliners: The authors have noted no indication in the press that the Cubans are actively seeking to acquire longliners.

It is not clear to the authors as to what Cuba offers that makes it an attractive partner for both European and African companies in these distant-water joint ventures. It may be that low wage rates for trained personnel makes Cuba an attractive partner to European companies. Trained Cuban technical personnel and experience with distant-water fisheries may make Cuba an attractive partner for the African companies.

The authors at this time can not confirm all of the above press reports concerning new distant-water operations. The shrimp operations off Canada, however, have been confirmed. The authors note that virtually all of the projects for which information is available specify trawling. The authors have seen no references to the purchase of commercial longliners or the resumption of commercial longline operations.

It is unclear to the authors where the Cubans have obtained $170 million in financing, if the press reports are accurate, to build new vessels and refit old vessels in Spanish shipyards. It may be that the Cubans have decided to commit scarce foreign currency reserves. There may also be a foreign joint venture partner helping to finance the vessels. The authors note that Cuba have business relations with a North African firm, Coral Suki S.A., that manages trawlers off Africa.[149] The authors are also unclear as to just what steps FCP has taken to ensure that these new vessels can be operated profitably, covering both the cost of construction as well as fuel and maintenance.

One development which may affect future Cuban fleet activities is the development of personal relations between Venezuelan President Hugo Chávez and Cuban President Castro. Chávez is an admirer of Castro. Chávez has already provided oil to cash strapped

Central American countries at concessional terms. He may well eventually do the same for Cuba. The future direction of this relationship is not yet clear, but access to Venezuelan oil at below market prices could have a substantial impact on the Cuban economy and fishing industry. President Chávez in 1999 announced a Venezuelan state oil company would help Cuba activate an idled Soviet-built oil refinery.[150] Additional future arrangements are possible.

14. Aquaculture

Cuba has given some attention to aquaculture in recent years. The authors have received varying reports about the output of Cuban aquaculture companies. For the purposes of this report we are using the data provided by Cuban officials to FAO, but note that some Cuban sources report much higher harvests than published by FAO. The authors do not understand the substantial differences being reported by FAO and Cuban sources.[151]

FAO Data: The Cuban Government has reported to FAO that cultured harvests in the late 1980s and early 1990s ranged from 18,000 t (1993) to 24,000 t (1990). Those harvests increased substantially and reached a record level of 46,000 t in 1997. The 1998 harvest declined to 38,000 t (appendix C1a2b).

Cuban data: The Cuban Government press reports that state-owned fish farms harvested over 70,000 t of fish in 1998. This was a 17 percent increase over the 58,000 t harvested in 1997. Fish farming enterprises have been assigned a goal of 80,000 t by 1999 and eventually hope to harvest 100,000 t in 2001.[152] Harvest at these levels exceed the non-shrimp aquaculture harvest of all Caribbean countries combined. MIP announced a particularly large increase in the 1999 cultured which reportedly totaled 80,500 tons (appendix C1b).

The Cubans aquaculture industry, unlike the industry in most other Latin American countries, focuses primarily on finfish for the domestic market. The Cubans have expressed some interest in marine shrimp culture, but have achieved only limited success.[153] Cuba continues to pursue shrimp culture and production is the highest of any Caribbean island. The Government's goal is to intensify operations and produce 8,000 t of shrimp for export.[154] The actual profitability of shrimp operations in market terms, however, is unknown. For several years the primary cultured species was tilapia. Since 1996, the most important species had been silver carp. Silver carp now constitutes about half of Cuba's overall cultured harvest. Officials continue to focus on aquaculture for future development, both freshwater and marine aquaculture. Marine shrimp is a priority, but there is also interest in other species including freshwater shrimp and bullfrogs.[155]

Results of the aquaculture industry in the past 2 years include:

1997: A record 46,000 t cultured harvest was reported in 1997. Cuban shrimp farmers reported an increase in the shrimp harvest to FAO in 1997 to 2,000 tons.[156] Farm managers point out that a major increase in 1997 harvests was achieved in spite of a severe drought in Cuba. Most of the Cuban aquaculture harvest was marketed domestically, supplying about 40 percent of the fish consumed in Cuba. This would mean that Cuban fish farmers currently supply a higher proportion of domestic seafood demand than any other Latin American country. Fish farming enterprises have also begun to export part of their freshwater shrimp, harvest, including eels, and tilapia (fillets). The Cuban fish farmers hope to soon replace all imports of frozen fish.[157]

1998: Cultured harvests declined to only 38,000 t because of lower carp and black bass harvests (appendix C1a2b1). Shrimp harvests continued at the 2,000 t level.[158]

Cuba's aquaculture industry in 1996 and 1997 reported sharply increased harvests, benefitting from expanded attention and support. The authors are unsure as to why the harvest declined in 1998 (appendix C1a2b). There would appear to be some limits on the development of aquaculture in Cuba. One of the major limitations on aquaculture development is that Cuba does not produce large quantities of fishmeal which is needed for fish feed. Shrimp feed requires especially large quantities of fishmeal. Cuban domestic meal production appears to have met the industry's needs to date and even provide for small quantities of exports.[159] Any major expansion of Cuba's aquaculture industry, however, especially the shrimp culture industry, will require imported meal, which Cuba may have difficulty financing.[160] An unknown factor is the price and availability of imported fishmeal. FAO projects a major increase in world aquaculture production during the next three decades.[161] As fishmeal production will probably decline over that period, the price of imported meal is likely to increase.

15. Economic analysis

Cuban publications often use the fishing industry as an example of the economic progress brought by the Revolution. Officials often compare fisheries catches before and after the Revolution and the improved living and working conditions of the fishermen, interspersed with the required anti-American and socialist

hyperbole. A typical Cuban media release is as follows:

> "In 1948--and much water has gone under the bridge since then--Cuba was an insignificant and underdeveloped country lost in the Caribbean and its image, a tropical isle of sugar cane, rum, tobacco, the rumba and beautiful women. It was the true tragedy of a people that were exploited by their powerful imperialist neighbor. That year Cuba's catch did not exceed 8,300 tons. Ten years later, following the overthrow of the tyranny that blooded the nation, in 1958 Cuba's catch totaled 21,900 tons. But on January 1, 1979 when our nation will joyously celebrate the first 20 years of its permanent liberation, Cuba's total catch will be 30 times the 1948 quantity (approximately enough 31 years later) and 10 times the 1958 quantity. But that is not all because the changes in the Cuban fishing industry following the victory of the Revolution are of such magnitude that not even a fairy tale or the imagination could explain them satisfactorily. Only the present situation of a people that became aware of their own future and who for over 7,000 days have fought and made efforts to win the future they deserve for themselves can offer a true interpretation of the fishing phenomenon in our country."[162]

Photo 12.--Cuba's most profitable operation is the coastal fishery for lobster which uses many low-tech, but highly effective methods.

The standard Cuban assessment of their fishing industry is much too simplistic. There has undoubtedly been substantial accomplishments, especially in improving working conditions and training fishery scientists, administrators, and fishermen. A variety of factors, however, detract from the simplistic view of the industry that officials often proclaim. The inefficient Cuban system of allocating resources, however, has resulted in poorly founded decisions that have wasted substantial resources--even scarce hard currency reserves. Other problems such as poor planning, inadequate incentives, faulty management of state-owned vessels, as well as factors beyond their control such as political developments in the Soviet Union and oil prices have all affected the industry's performance. Much of the inefficiencies became apparent after the dissolution of the Soviet Union. Without the massive Soviet subsidies, fishing operation had to be suspended and catches in the 1990s plummeted to 1960s levels (appendix C1a1).

Achievements: The Cuban fishing industry and undeniably reported solid achievements. The fisheries catch was increased significantly. The living and working conditions of the average fishermen have markedly improved. Cuba now probably has the best educated and trained fishermen and fishery scientists in the Caribbean--with the possible exception of Puerto Rico. Cuban researchers carry out an effective research program which focuses on studies of direct benefit to the industry. Major coastal fisheries, such as the important lobster fishery, are managed by competent, well trained fishery scientists and officials.[163]

Questionable policies: While fisheries catches were increased, any discussion as to the actual cost of producing that fish and its real market value (reflecting consumer desirability) is avoided in the Ministerio de la Industria Pesquera (MIP) press releases. Cuban fishery managers have made several questionable decisions that appear to have resulted in unproductive allocation of resources, especially scare foreign currency. At a time when other countries were reducing distant-water fleets, Cuban planners followed Soviet models, purchased the costly Río Damuji class distant-water trawlers in Spain. The vessels were designed for fisheries off other countries. An increasing number of countries were, at the time, declaring 200-mile zones. One observer describes this as "fraught with bad timing".[164] Other observers are much more critical of the entire planning process associated with purchase of large, expensive vessels for Cuba's distant-water fishery.[165] The Cubans did not carefully assess the access issue in advance with the coastal countries (especially the United States) off

which they planned to operate.[166] In addition, these trawlers required large amounts of fuel to operate which was only possible with fuel provided by the Soviets at subsidized prices.

Lost opportunities: The use of fuel for unprofitable distant-water operations would appear to represent significant lost opportunity costs. Fuel prices, and thus the market value of the Soviet fuel subsidy, have fluctuated significantly. Real fuel costs in 1998 and 1999 reached all time lows. The cost of fuel during the 1970s and much of the 80s was exceedingly high. Price levels in 2000 and 2001 rose significantly. The quantity of fuel consumed by distant-water vessels represented very significant dollar amounts at the rising price levels during the 1970s and 80s. The authors are not sure that if the true cost of distant-water operations were computed that would in fact be the case. Of course one difficult to assess factor is that the Soviets probably were more willing to provide oil for the state owned fishing fleet than they would have been to provide oil to be used for financing food imports. Investments in more promising operations may have returned profits and a net economic benefit or funded large quantities of imported food greater than the quantity of food produced by the Río Damuji-class trawlers. The Government calculated, however, that the amount of protein produced in distant-water operations would have cost more to import directly.[167]

Unprofitable operations: Cuban state companies, especially the distant-water fishing operations, operated for years without any need to make or return actual profits. In any case, the lack of reasonable accounting practices and realistic production cost data made valid profit calculations virtually impossible. Highly unprofitable operations were possible in Cuba and in many years continued for years. The Cuban Revolution, however, did not repeal the basic laws of economics and thus the distant-water fishing operations and other unprofitable state activities represented a drag on the economy. This was dramatically show cased when the Soviets subsidy ended. The problem posed by these unprofitable operations had to be addressed. Economic reforms in Cuba during the 1990s have attempted to make companies financially accountable and officials say that all fishing industry associations and companies are now profitable.[168]

Misallocation of resources: Cuba's attempt to establish a distant-water fishery required the investments of huge sums. The longliners and trawlers built in foreign shipyards were very costly and had to be paid in foreign currency. In addition additional major outlays were needed for foreign specialists, training, port facilities, gear and equipment, and other infrastructure costs. At the same time, many profitable coastal fisheries were given a lower priority.[169]

Cuban officials report that the country's focus on distant-water fisheries has been sharply scaled back, but such operations have not been abandoned entirely. The distant-water longline fleet acquired in the 1960s-70s, has been largely retired, although Cuban officials continue to be interested in distant-water trawling. Officials report that the traditional fisheries in Cuban waters are stable and probably can not be expanded significantly because the resources are already heavily exploited. The current focus of MIP is on aquaculture where officials believe catches can be substantially increased. Officials are especially interested in shrimp aquaculture because of the high potential foreign exchange earnings.[170] Actual cultured shrimp harvests, however, continue at relatively low levels.

One reason that MIP continues to be interested in distant-water operations is the infrastructure built up over the years. Substantial investments have been made in facilities from port infrastructure to training schools. Several thousand individuals have been trained in operating the vessels. Now that Cuba no longer conducts extensive distant-water operations, these individuals now have very limited job prospects. A new company, AGECREW, was formed in 1996 to obtain jobs for these individuals aboard foreign vessels. (See "XI. Companies".) The jobs involved ranged from vessel captains to crew members.[171]

No information is available to the authors as to the profitability of the current Cuban distant-water operations. As fuel now has to be purchased at international prices and some of the operations involve joint ventures with foreign companies, it seems likely that the current operations, all involving trawlers, may actually be profitable. The authors know of no published information assessing the profitability of these distant-water joint ventures. Cuban sources suggest that a realistic economic assessment of FCP and FAC operations was a difficult undertaking.[172] The first serious effort known to the authors was in 1988-89 when the MIP Comisión de Desarrollo concluded that further investments should not be made in distant-water fishing.[173] Since then Cuba has made modest investments in a few distant-water trawlers. Cuban managers have presumably looked at the economics of these new operations more carefully than they did when much larger investments were made in the 1960s and 70s.

II. Species

Cuban research institutes have done some work on tunas, but very little specifically on swordfish.[174] The authors have noted several Cuban reports, but several other published reports have proven difficult to obtain in the United States. Cuban researchers have mentioned some of these reports to the authors and we have noted some of the more important ones for readers desiring additional information. Several other reports were prepared and not published. As some of the researchers involved have since left Cuba, this work may be lost. Difficulties in developing exchanges with Cuban researchers have made it problematic to fully access the extent of Cuban research. The authors have been unable, for example, to assess the existing "grey" literature. Much of the available published Cuban work is associated with the Cuban artisanal longline fishery off the northwestern coast. The authors have been able to find some published research associated with the much larger commercial longline fishery in the eastern and central Atlantic. The reports, however, primarily describe yellowfin tuna which was the target species.[175] Much less has been published on swordfish. The Cubans have not conducted the same level of research in their distant-water fisheries as they have done in their coastal fisheries. This is understandable as research on highly migratory species is expensive to conduct and as one researcher explains, "The view was that we 'possessed' our coastal resources and they provided millions of dollars in revenues while in distant-water fisheries, we did not really 'possess' the resource."[176] Even so several papers were published providing basic information on the fishery.[177]

A. Spawning

The spawning grounds for swordfish are primarily deduced by the location and abundance of swordfish larvae, because of the impracticality of observing actual spawning. Some research, however, has been carried out by both Cuban and foreign researchers.

Several authors have addressed the subject of swordfish spawning, primarily by assessing the presence of larvae, but some gonad studies are also available. Some researchers speculated that spawning occurred in the lower ("southern") Caribbean as well as the Gulf of Mexico and the southeastern United States coast as far north as the South Carolina coast. Several authors believed that there was considerable spawning activity off and around Cuba.[178] Gradually data on swordfish larvae has been compiled to give an increasingly better picture of spawning patterns.[179]

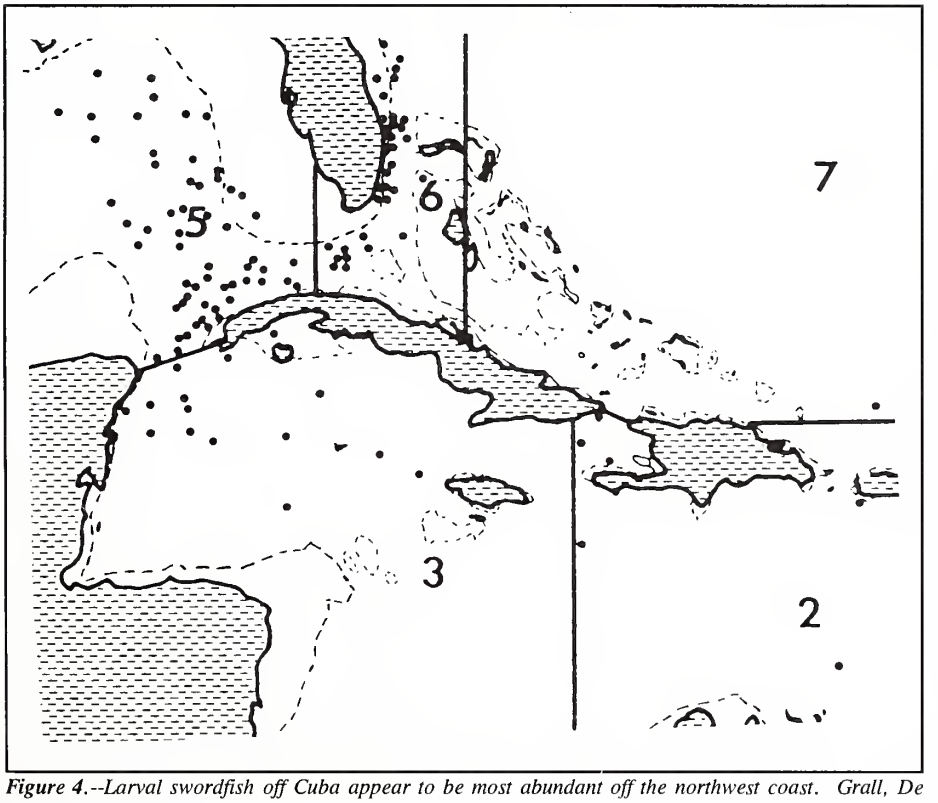

Figure 4.--Larval swordfish off Cuba appear to be most abundant off the northwest coast. Grall, De Sylva, and Houde

Foreign researchers have reported the following pattern:

Florida Straits: Foreign researchers reported that artisanal fishermen were landing swordfish with ripe ovaries from the water between Florida and Cuba during the 1940s.[180] A 1998 report by University of Miami researchers have found substantial numbers of billfish and swordfish larvae in the Straits of Florida north of Cuba. The presence of these larvae along with juveniles and adults has led the researchers to speculate that swordfish are spawning in the Straits.[181] The Florida

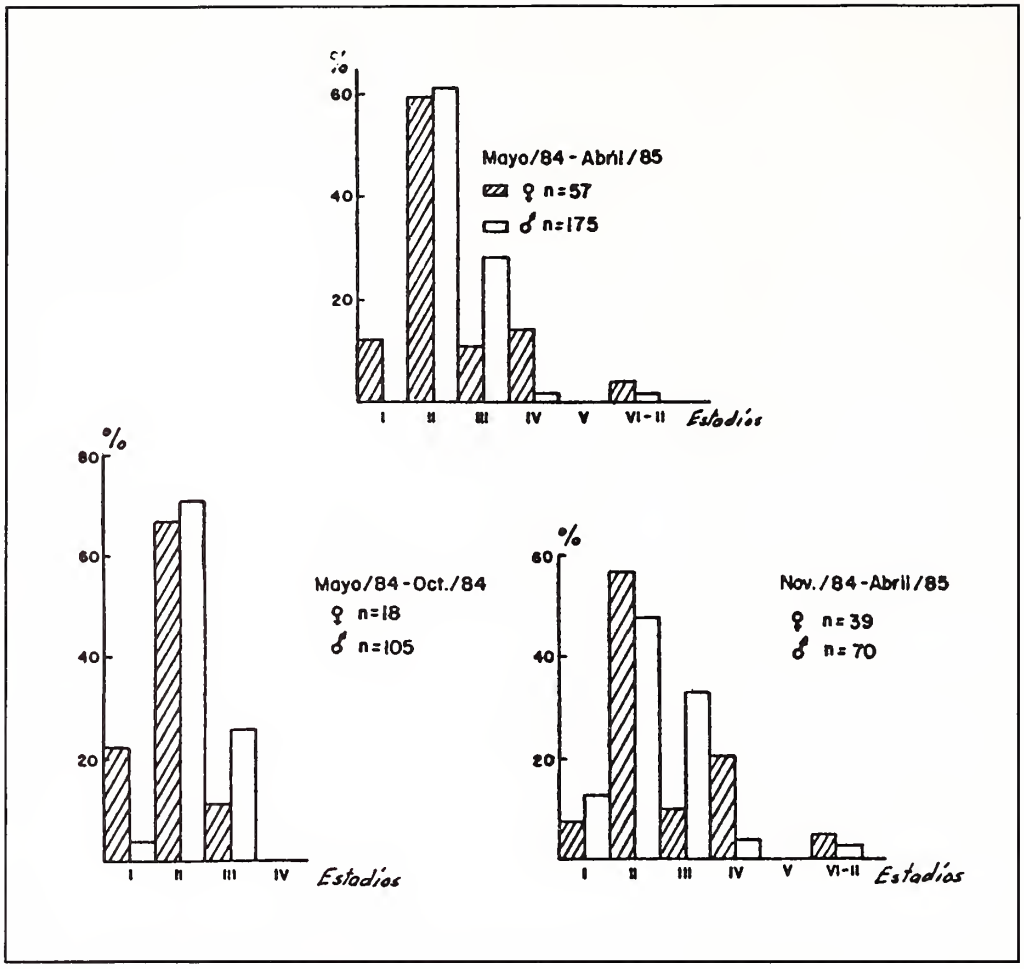

Figure 5.--Some Cuban researchers report low, but seasonably variable, swordfish maturation levels off the island. Espinoza, Sosa, Moreno, and Quevedo

researchers, however, are concerned with changes in the abundance of swordfish larvae. (See: "I. Stock status", below.)

Yucatán Channel and Windward Passage: Researchers have identified the Yucatán Channel (between Mexico and Cuba) and the Windward Passage (between Cuba and Haiti) as areas where mature fish are found and spawning may be occurring.[182] Some larvae have also been found in the Windward passage between Cuba and Haiti.[183]

Gulf of Mexico: A recent analysis shows a similar pattern, but a more pronounced concentration in the eastern Gulf of Mexico away from the Cuban coast and the Yucatán and Florida Straits (Venezuela, figure 10). The numbers of small larvae were particularly notable in the eastern Gulf of Mexico, strongly suggesting that this is a major spawning ground.[184] Considerable spawning activity is reported west and north of Cuba in the Yucatán and Florida straits and Gulf of Mexico (figures 4 and 6). Most of the spawning appears to occur northwest of Cuba in the Gulf of Mexico, based on the significant concentrations of small larvae found there.[185] The abundance of swordfish larvae noted in the Gulf of Mexico, however, could be in part due to the more intense sampling effort off the U.S. coast than in other Caribbean waters (Venezuela, figure 10). Corrected for intensity of sampling effort, the presence of larvae in the eastern Gulf is notable and directly east into the Florida Straits swordfish larvae are especially abundant.[186]

Caribbean: One 1983 study reported that there is relatively little spawning within the Caribbean itself, although some limited spawning does take place south of Cuba.[187]

Sargasso Sea: Researchers have noted swordfish larvae in the southern Sargasso Sea, just north of the Antillian Arc.[188]

Cuban researchers working with the artisanal fleet have reported varying accounts of spawning activity off Cuba. Most of the Cuban work has focused on the northwestern coast where an artisanal longline fishery was conducted, but there has been some work south of Cuba as well. The Cuban work shows some varying results.

Northwestern Cuba: Cuban researchers assessing fish taken by artisanal fishermen in coastal waters off Cuba's northwestern coast found extremely low levels of sexual maturation (appendix B3b).[189] Other Cuban researchers have reported similar low levels of sexual maturation with some increased maturation during the winter and early spring (figures 5 and 14).[190] Another study reported a slight increase in the level of mature fish, especially the females, during the first half of the year (appendix B3b).[191] Other Cuban researchers found numerous large females with highly developed ovaries as well as the presence of swordfish

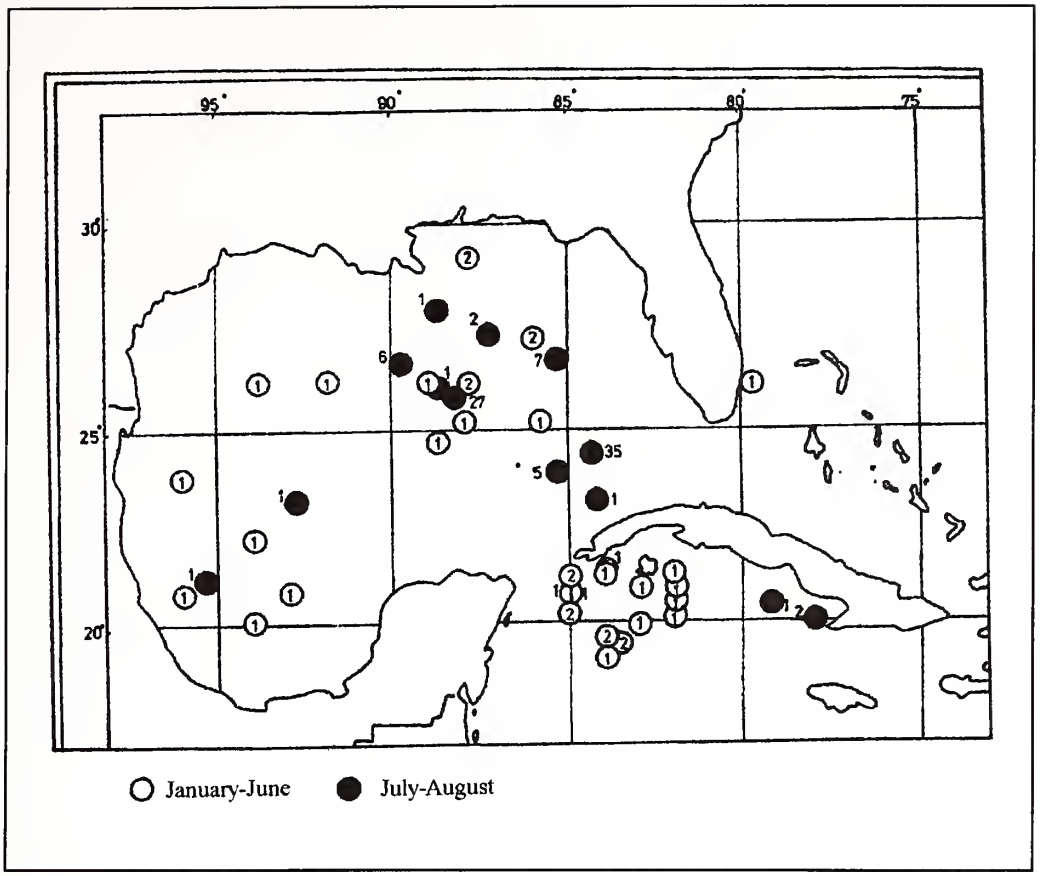

Figure 6.--The CIP found swordfish larvae to be abundant northwest of Cuba in the Gulf of Mexico (Jan.-June). Small concentrations occurred (July-Dec.) off the southwest coast. Rodríguez et. al.

larvae off the northwestern coast.[192] Maturation levels, however, appear highly variable (appendix B6).

Caribbean: Cuban researchers have reported finding some larvae in the Caribbean south of Cuba, especially around the Cayman Islands.[193] Cuban researchers in 1988 reported on the results of their larvae collection work. They have compiled data on the presence of larvae over a wide area of the northwestern Caribbean and Gulf of Mexico. They report finding swordfish larvae in about 9 percent of the sampling stations and usually only one sample.[194] The Cubans report that unlike some previous researchers, they found swordfish larvae to be most abundant in the second half of the year (figure 5). They found two sampling stations (off the northeast coast and further out in the Gulf of Mexico) that had relatively large numbers of larvae during the second half of the year. Interestingly, there were larvae found during the first half of the year off the southwestern coast and the Caymans.[195] Although not large numbers, the occurrence at many stations in this area was noteworthy.

There appear to be notable seasonal fluctuations in spawning activity. Larvae are present throughout the year in the western Caribbean and Gulf of Mexico, but most prevalent in the late fall, winter, and early spring. Differences have been reported in the pattern of small and large larvae. The general seasonal pattern would conform with the theorized seasonal migration north during the warmer months of the larger mature females. Some seasonal data on sexual distribution has been compiled by Cuban researchers (appendix B2).

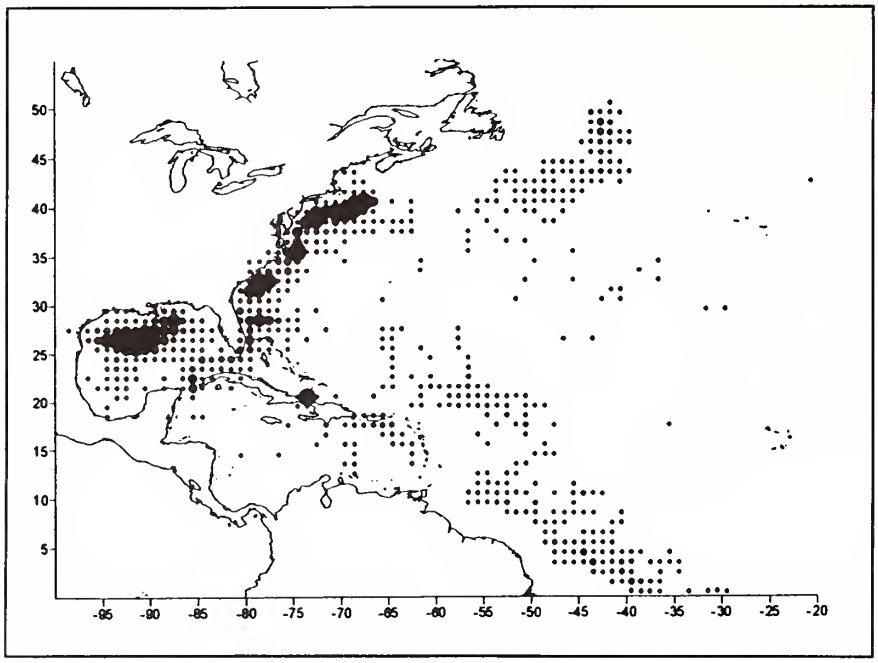

Figure 7.--Sets by U.S. longliners show the probable route of swordfish from Cuban waters to rich feeding grounds off New England and Canada. This is based on 1997 data. Jean Cramer

B. Behavior

Researchers in several countries as well as fishermen have reported a relationship between lunar cycles and swordfish catches. Presumably the added light intensity during the night affects the feeding behavior of the fish and thus accessibility to the fishery. Cuban researchers working with artisanal fishermen off the island's northwestern coast in 1984-87 , however, did not note such a relationship (appendix B1b2).[196] An earlier study, however, had found such a relationship and advised fishermen to adjust the depth of the hook lines ("brazoladas") according to the moon phase. The fishermen were advised to increase effort at shallow depths on clear days with full moons ("luna nueva").[197]

C. Migrations

The best evidence on fish migrations is tag returns. Unfortunately, because of the difficulties associated with tagging swordfish, there are a very limited number of returns. The available evidence, however, do show movement back and forth from Florida/the Bahamas/Cuba to and from the North Atlantic. Fish have been tagged/retrieved off western Cuba in the Yucatán Straits, central Florida, and off the northern Bahamas moving to and from the north Atlantic north of 40°N and west of 50°W (figures 8 and 9). Some biologists believe that the movement north and south may reflect the fish returning to their same summer feeding grounds each year.[198] The tag returns as well as the intensity of fishing effort (figure 7) suggests, at least on the northern leg, movement with the prevailing northerly flowing Gulf Stream. It

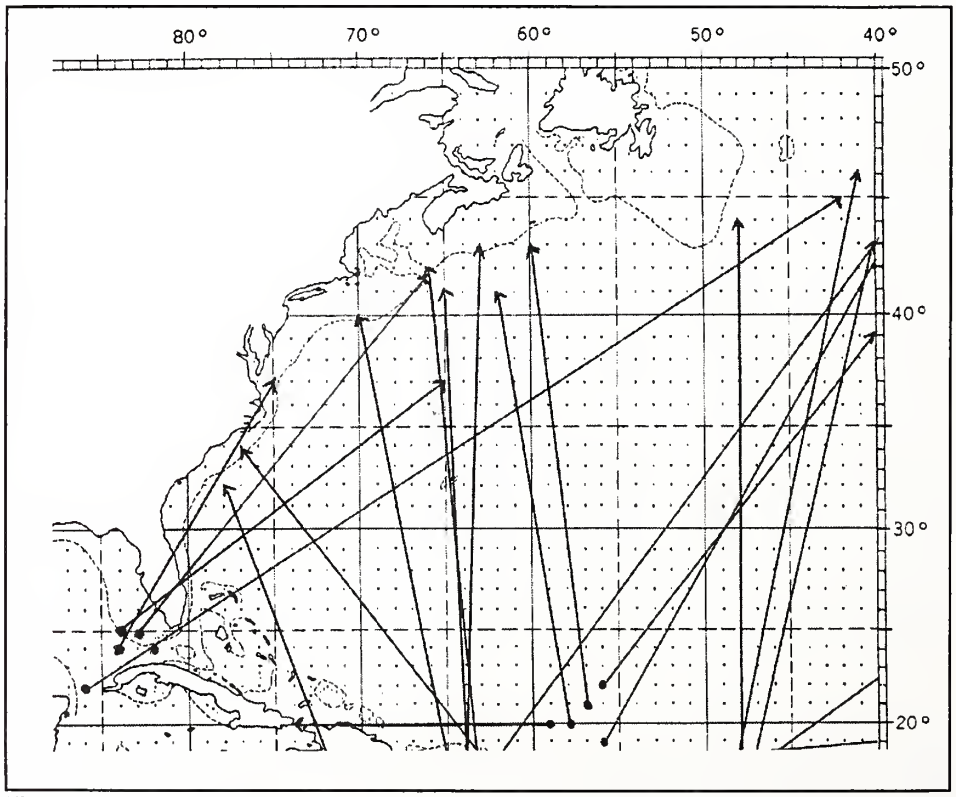

Figure 8.--The swordfish tagged off western Cuba that have migrated have been retrieved in the Gulf Stream system, all but one fairly close to the U.S. coast, west of 75°W.

is unclear if the fish return along the same relatively direct route. Another possibility is that the fish may follow the North Equatorial Circulation. (See "III. Grounds".) There is reason to believe that swordfish in other areas may follow the prevailing ocean current patterns.[199]

Only a few tag returns are available for fish either tagged around Cuba or retrieved near Cuba. The number of tag returns is still very small and do not permit the formulation of any definitive conclusions. Some preliminary speculations, however, are possible. The most notable is that available tag returns are consistent with the theorized migratory route of swordfish following the Gulf Stream north to rich north Atlantic feeding grounds. Less clear is the route the fish follow back to Caribbean waters to spawn.

Resident fish: Tag returns suggest that some fish are not making long migrations. Some fish tagged and retrieved near Cuba have moved north, east, south, and west (Bahamas, figure 3). Of course it is possible that a fish may have been tagged and retrieved in waters off Cuba, but in the interim made a lengthy migration to north Atlantic feeding grounds. At this time the only way of assessing this is to check the time interval (Caribbean overview, appendix C3). Time interval data, however, while possibly suggestive is hardly definitive.

Northern migration: Tag data does appear to show that the fish tagged off Cuba follow the Gulf stream north to feeding grounds off New England and the United States. All of the small number of tag returns showing swordfish moving north have been retrieved in the Gulf Stream system. Most were relatively close to the U.S. coast, west of 75°W. Only one moved significantly east, being retrieved almost at 40°W (figure 8). This follows a familiar pattern. Fish tagged in the western Caribbean are generally retrieved along the eastern U.S. coast, west of 65°W. Fish tagged in the Atlantic beyond the Antillian Arc have often been retrieved at some distance from the U.S. coast, east of 65°W (Anguilla, figure 4).

Southern migration: Tagging data is less definitive concerning the southern migration. Some of the fish may be returning south by retracing their northern migration along the Gulf Stream. Other fish may be following the North Atlantic Gyre back to the Caribbean. Some fish appear to be reentering the Caribbean through the Windward Passage (figure 9). Most of the swordfish retrieved off western Cuba were tagged relatively close to the U.S. coast. Fish retrieved off eastern Cuba near the Windward Passage have been tagged both along the U.S. coast as well as further east in the north Atlantic.

Cuban researchers note that other evidence such as sexual and size seasonal distribution tend to confirm the fact that swordfish are making seasonal migrations.[200] (See "D. Seasonality" and "F. Sexual distribution".) The authors know of no Cuban research attempting to trace the path of these migrations. The Cuban research does show that swordfish are present off Cuba year round, confirming that not all of the swordfish off Cuba, especially the younger smaller fish, participate in the annual migration. The authors also note no published Cuban work on migration or tag returns from the distant-water commercial fishery.[201]

One interesting observation by Cuban researchers and fishermen is that during the winter season male/female pairs are often observed.[202] No

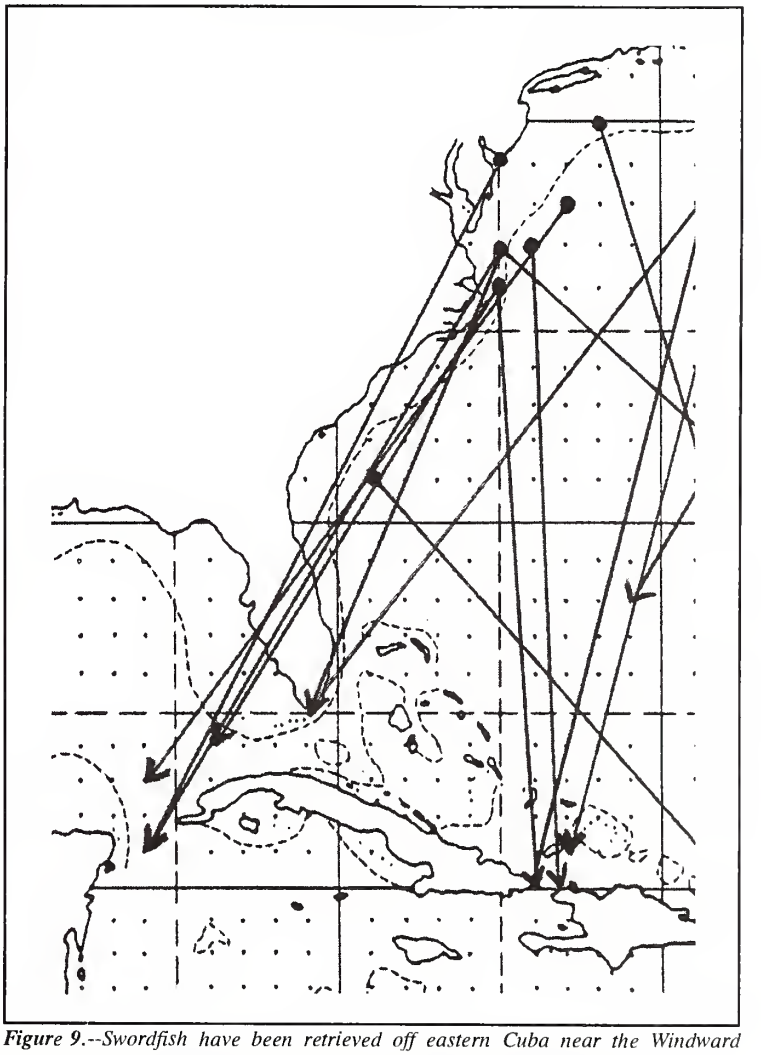

Figure 9.--Swordfish have been retrieved off eastern Cuba near the Windward passage. The actual migratory path can not be confirmed at this time.

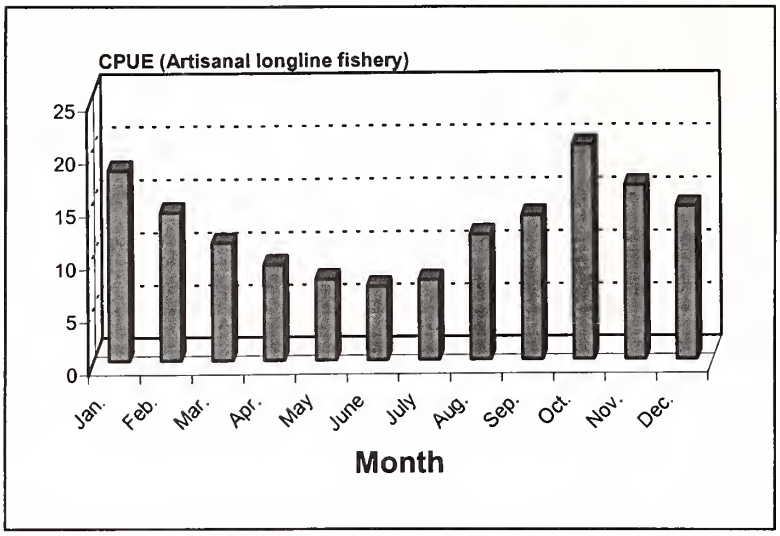

Figure 10.--Artisanal fishermen along the northwest coast during 1984-87 reported a distinct seasonal pattern with the best swordfish catches from September through March.

information is available on the social interactions of these presumably mating pairs.

D. Seasonality

1. Off Cuba

No precise seasonality data is available on swordfish off Cuba. A considerable amount of data, however, is available from the fishery. Seasonal patterns can be observed in the artisanal fishery targeting swordfish which is reported off the northwestern coast and other areas. Some data is also available from a small number of commercial longliners targeting tuna. The data from these different fisheries show some variations (figure 13). This data is of special interest because researchers believe that the seasonal catch patterns reflect seasonal migrations are related to feeding and reproductive activity. There are also differences between studies conducted at different times and for different time spans.

Swordfish does not appear to be as seasonal as the billfish or many sharks. Swordfish of all sizes are present around Cuban year round. There are, however, some distinct seasonal patterns apparent in the various longline fisheries.

Artisanal northwestern fishery: CIP researchers have sampled the artisanal fishery off the northwest coast for many years and is thus and important data set on Caribbean swordfish. This is the best longline fishery off Cuba. Catch and CPUE data from the artisanal fishery conducted off the northwestern coast confirm that swordfish are caught year round. The highest CPUEs according to available data appear to occur from August to March, especially from September/October to January (appendix B1b2 and figure 10).[203] A 1988 study contained an index of seasonality with the highest catches in October and January through March. The lowest catches were from April through July (figure 12).[204] A slightly earlier report suggests that the best yields are obtained in October and the first quarter of the year.[205] Another study conducted in the early 1970s (1971-73 data) indicates that the seasonal pattern can vary substantially from year to year, but that catches usually peak in November and some time early in the year from February to April, but fall to low levels during June or July.[206] Data from the early 1980s (1981-84 data) shows substantial variations in CPUE throughout the year, within 10-16 kg per 100 hooks (100-160 kg per 1,000 hooks. Data available for a longer time series (1981-86) shows some even larger variations (figure 11).[207] The highest yields during 1984-87 were reported in October and the lowest in March. Good yield were also reported in January and August (appendix B1b1).[208]

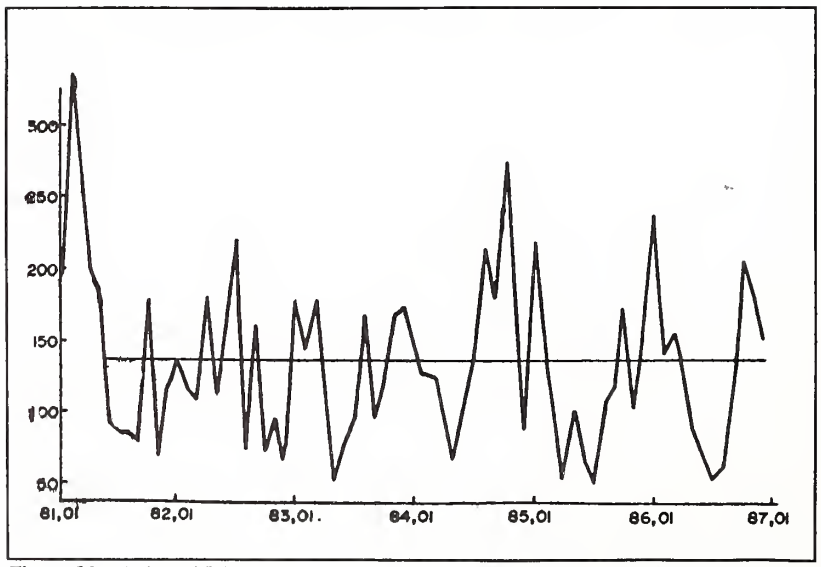

Figure 11.--Artisanal fishermen reported substantial annual differences in the yields (kg/1,000 hooks) achieved during 1981-86. Muñoz, et. al.

Artisanal southwestern fishery: Some seasonality data is available from the more limited fishery off the southwestern coast out of Santiago. The seasonality was somewhat different than that of the northwestern fishery, although Cuban researchers

caution that the more limited data available for this fishery means that the results are only preliminary. The peak of the fishery was from February through April, although relatively good catches began in October (figure 12).[209]

Commercial tuna fishery: Some seasonality data is available from the commercial longliners targeting tuna off Cuba. CIP researchers have compiled seasonality data, although operations were limited. FAC occasionally deployed longliners off Cuba and thus was able to provide comparative seasonality data using the same gear and methods. The seasonality reported off Cuba was different than that reported in artisanal operations, peaking in August through November (figure 12). FAC conducted only limited operations off Cuba and the authors or unsure as to how valid the assessment off Cuba was. The seasonality in the distant-water fishery, was more similar to the results that the artisanal fishermen off Cuba were reporting. Fairly high catch levels were reported through most of the year, but catches dropped sharply from July through September (appendix B1d).[210]

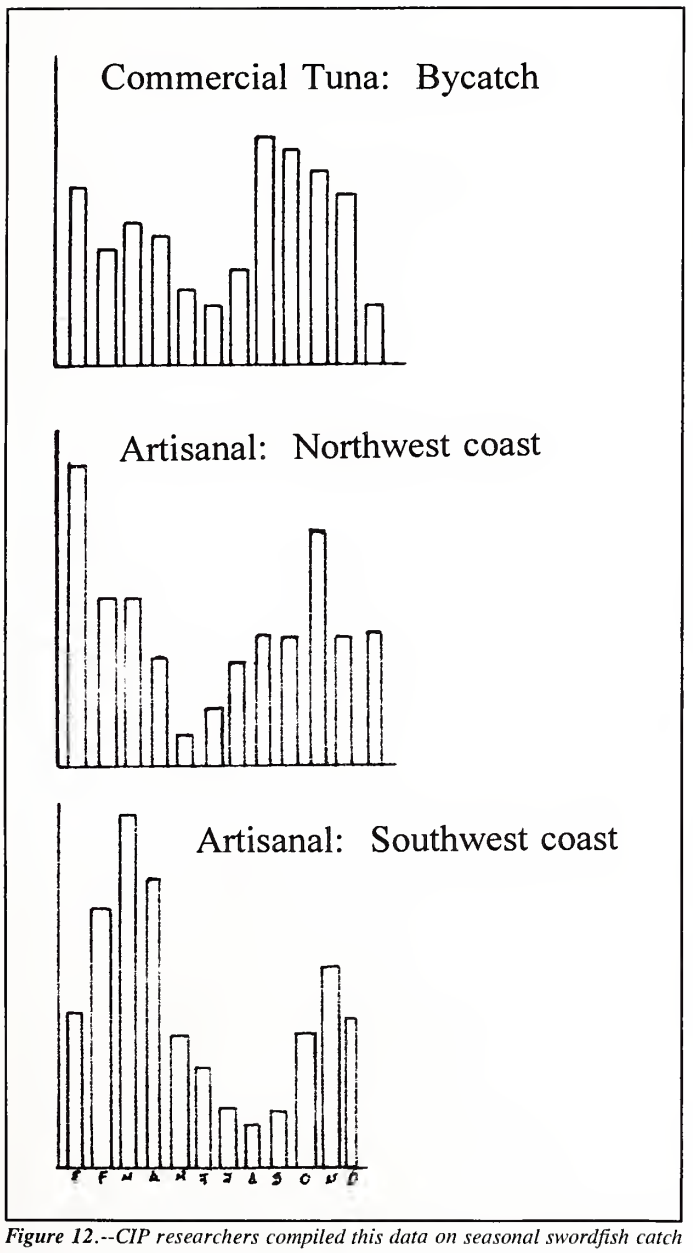

Figure 12.--CIP researchers compiled this data on seasonal swordfish catch fluctuations in three longline fisheries off Cuba during the 1980s. Rodríguez, et. al.

While available yield studies provide somewhat differing results, the overriding pattern is that catches in the artisanal fishery are generally the highest during the cooler months and the lowest during the warmer months. The commercial longline fishery targeting tunas reported a somewhat different pattern (figure 13).[211] Cuban researchers are unsure why the data from the artisanal and commercial fisheries are different. CPUE and catch data are fisheries-dependent and do not always provide precise indicators of actual abundance. In addition the commercial fishery was targeting bigeye and setting during the day. The various data sets however, document seasonal fluctuations in the fishery which presumably to an extent reflect actual abundance. As the commercial fishery was not targeting swordfish, it probably is the weaker reflection of abundance.

The size of the swordfish off Cuba appears to vary seasonally. A 1984-85 study of the swordfish taken by the artisanal fishermen shows that while some large fish were present in Cuba year round, the numbers of large fish were highest during the cooler winter months (appendix B3c).[212] This would tend to support the theorized migration north of larger fish during the Spring and Summer months.

2. Tropical Atlantic

Cuban researchers have also published some information on the seasonality of their distant-water longline fishery conducted by FAC in the tropical Atlantic (Cuban publication usually refer to the eastern central Atlantic) off Africa and northeastern South America (figures 22 and 41). Unlike the artisanal fishery, the distant-water fishery primarily targeted yellowfin and swordfish was only a bycatch.

The authors have been able to acquire less information on the seasonality of swordfish catches in Cuba's distant-water operations in the tropical Atlantic. One CIP report, analyzing data from FAC longliners from 1973-85, found that the peak months were May and October to January.[213] This appears quite similar to the seasonal

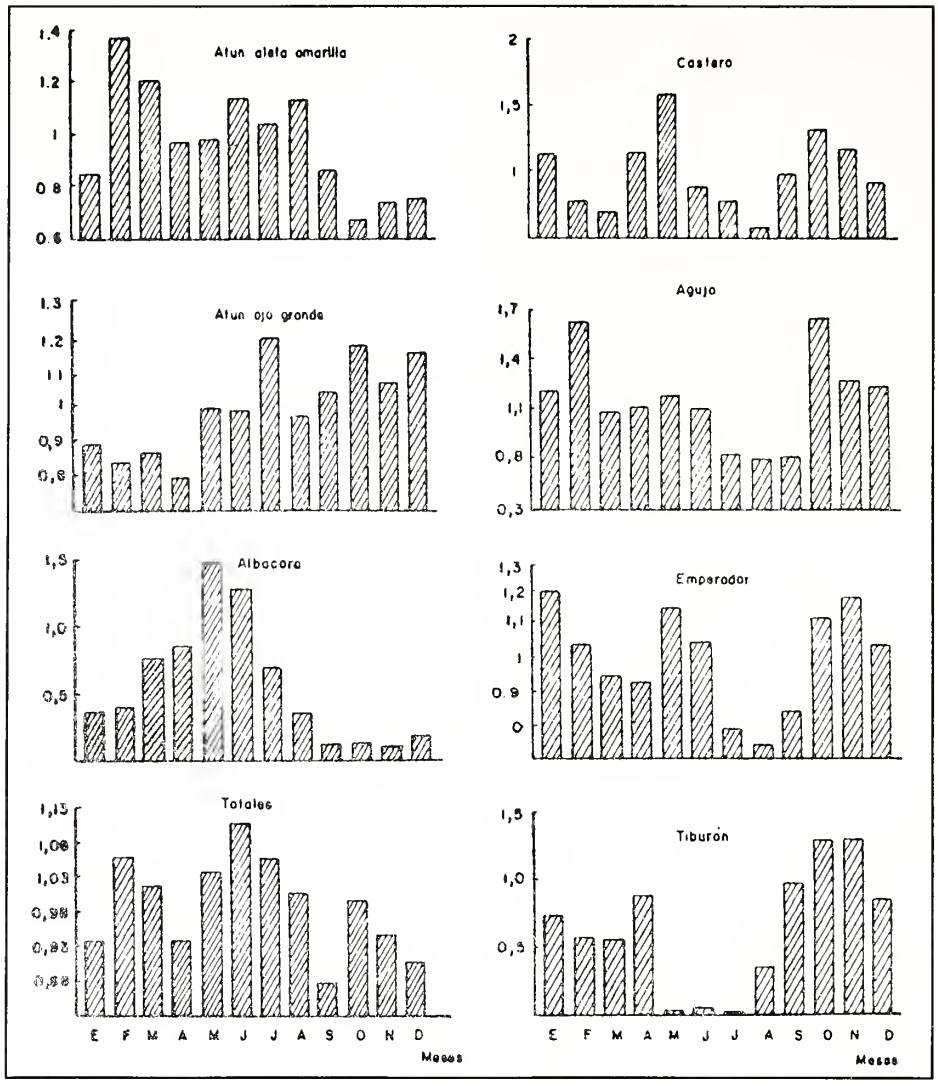

Figure 13.--CIP researchers prepared this seasonal data for their commercial longline fishery in the tropical Atlantic. Swordfish is "emperador". See appendix B1d for species key. Rodríguez et. al.

variations in the Caribbean and off northwestern Cuba, although the low months are slightly later in the year.

E. Nursery/Breeding area

Larvae spawned in the southern Caribbean are believed to be carried north into the Gulf of Mexico and Gulf Stream system. Swordfish spawning off western Cuba produce larvae that can be moved by the current flow into the western Gulf of Mexico and into the Gulf Stream where they can be transported north along the U.S. eastern coast. Cape Hatteras is the northern limit for significant concentrations of larval swordfish. It is not well understood, however, to what extent the larvae are transported by current flow or settle to mature in locations near the spawning grounds.

Juvenile swordfish are abundant in areas just to the north of Cuba between Florida and the Bahamas.[214] The area along the Gulf Stream between Florida and the Bahamas may in fact be a nursery area for juvenile swordfish.[215] Swordfish larvae are abundant off the eastern coast of Florida. The larger larvae found off Hatteras may well be from fish spawning off western Cuba.[216] Both swordfish spawning and nursery areas appear to exist off Cuba. Some Cuban researchers concluded that the northeastern coast of Cuba is a nursery area for swordfish.[217] Different investigators, however, researchers have reported some varying results. Research has been conducted in both Cuban and nearby U.S. waters.

1. Cuban waters

Cuban researchers have given some attention to the swordfish taken by artisanal fishermen off the northwestern coast. The researchers involved, however, have come up with strikingly different conclusions.

a. Juvenile concentration

The primary area in which swordfish have been taken off Cuba is along the northwestern coast, often relatively close to the coast. This area has been heavily targeted by artisanal fishermen (figure 19). This is a very coastal occurrence of the species which usually is found at greater distances from coasts. One researcher reports that the artisanal fishermen sporadically took very small fish that were clearly juveniles.[218] Some Cuban biologists, noting the low level of gonadal development (appendix B3b), speculate that the area is a nursery area and as the fish mature, they move north into offshore waters. The fish grow there and are gradually incorporated into the adult

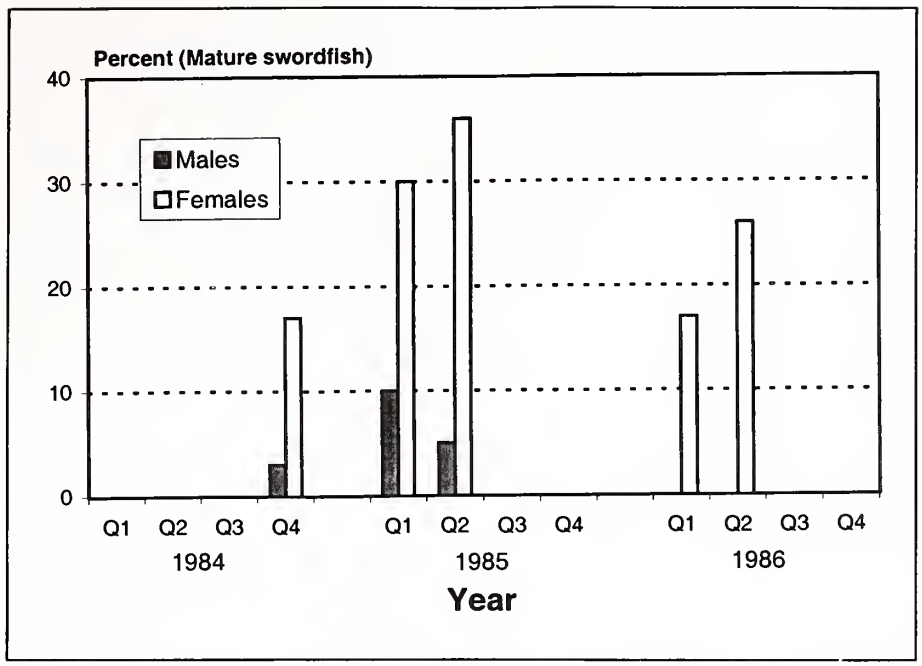

Figure 14.--Males are much more common in the catch of the artisanal fishery off Cuba's northwest coast. One Cuban study, however, found very low maturation levels.

population.[219] While some Cuban researchers report many males and females show a low level of gonadal development, the males in particular show strikingly low levels. Cuban biologists also report that the fish found in coastal waters off the northwest coast are substantially smaller than the fish found off the United States and especially Canada to the north.[220]

b. Mature fish

Other researchers report diametrically different results. One researcher reported ripe ovaries from fish taken along the northern coast of Cuba.[221] A Cuban researcher notes that during the winter months, the peak fishing season, that numerous large females are present with developed ovaries, although at various maturation levels (appendix B6).[222] Researchers have also noted the presence of swordfish larvae in the waters around Cuba, both the Gulf of Mexico and Caribbean, especially around the Cayman Islands.[223] Larvae are of course an indicator that spawning adults are present.

2. Nearby U.S. waters

U.S. fishermen operating along the Gulf Stream to the north of Cuba report taking relatively large numbers of juvenile swordfish which they have to discard. The presence of juveniles fluctuates over time, but appears to persist between years and seasons.[224] This suggests the possible location of a nursery area in the Gulf Stream between the United States and the Bahamas.[225] The authors note, however, that U.S. fishermen take juvenile swordfish much less frequently in the Florida Straits between Key West and Cuba than further north between Florida and the Bahamas. There is, however, less fishing effort in the Florida Straits.[226] The authors have no details on the southern limits of this theorized nursery area. The age of the fish can be roughly determined by weight and size data. Cuban researchers did a number of studies which included length and size data of the fish taken in the artisanal longline fishery.[227] This data is somewhat difficult to use as the researchers have not always consistently used the same measurements, making size

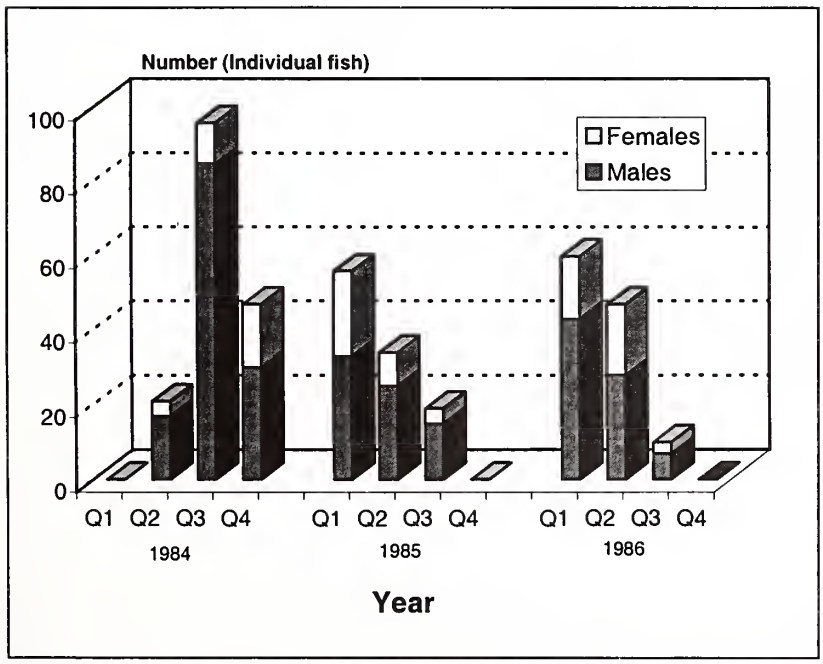

Figure 15.--Much of the swordfish catch of the artisanal fishermen is males, although there are significant seasonal variations.

comparisons difficult.[228] The large number of small individuals noted by Cuban researchers suggest that a nursery area may also exist south of the Florida straits to the Cuban northwestern coast. Different fish may be involved as some researchers have reported differences in the fish found off Florida and off Cuba. (See "J. Stock structure" below".)

F. Sexual distribution

Cuban researchers have done some work on swordfish sexual distribution. The Cuban findings tend to support the theorized seasonal migration of swordfish north into richer feeding grounds during the warm summer months. The Cuban research is fisheries dependent work.[229] Cuban researchers have reported a very high proportion of males along the northwestern coast where the artisanal fishery is conducted. One researcher in 1964 found a male ratio of 2.5M to 1F.[230] Another group of researchers in 1984-86 found a similar ratio, 2.6M to 1F (appendix B2).[231] Many of the females had ripe ovaries.[232] Sometimes elevated concentrations of males suggest a spawning area. This does not seem to be the case off northwestern Cuba, however, given the low rate of gonadal development reported by Cuban researchers. This predominance of males is a phenomenon that has remained clearly observable since it was first described during the 1960s.[233]

The sexual distribution of swordfish and especially the presence of females off Cuba is highly seasonal. One research group found that females off northwestern Cuba were relatively rare during the warmer months (May-October) and more abundant during the colder months (November-April). The females were much less abundant than males during both seasons (appendix B3c).[234] The authors have obtained only limited data on the sex ratio. While the data confirms the predominance of males, there appears to be substantial annual variations (appendix B2).

G. Feeding

One Cuban researcher reports that swordfish off Cuba feed on finfish and squid. The results are based on a small sampling of the artisanal catch over only 2 months of one year. Thus the study is only a preliminary assessment. They are, however, the only published Cuban report of swordfish feeding behavior known to the authors. The single most important item in the diet off Cuba was Atlantic pomfret (*Brama*) which constituted 37 percent of the prey items found in the stomach of the fish taken in the artisanal longline fishery off northwestern Cuba during the early 1960s (appendix B5). Squid (especially *Thysanoteuthis rhombus*) was also important, totaling 28 percent. The only other major item identified was shrimp, which made up about 4 percent of stomach contents. Small amounts of red hind or "cabrilla" (2 percent) and octopus or "pulpo" (2 percent) was also reported.[235] It should be noted that a substantial portion of the swordfish taken in the fishery off northwestern Cuba are small males (appendix B2). Thus feeding strategy is probably affected by their size. The authors know of no Cuban studies assessing feeding patterns of different sized swordfish. It is possible, for example, that larger females may consume lesser amounts of small demersal prey items like shrimp.

H. Abundance

CIP researchers in 1988 published a study assessing the abundance of large pelagics taken by the FAC longliners in the tropical Atlantic from 1973-85. While swordfish was only a bycatch of the targeted yellowfin, the CIP researchers made a variety of observations touching upon swordfish abundance.

Variability: Catches of the targeted yellowfin were the most stable. The greatest variation was found with billfish (other than blue marlin) and to an only slightly smaller extent, swordfish.[236]

Composition: Beginning about 1980, the CIP researchers noted a substantial decline in the catch composition while the gear and fishing strategy remained constant. The proportion of yellowfin decline and the proportion of other species (shark, swordfish, and blue marlin) increased.[237]

Cycles: The CIP researchers attempted to determine cycles in abundance levels, using Schuster periodgrams, but could not detect one for swordfish.[238]

Seasonality: The peak months for swordfish were May and October through January. This was quite distinct from that of the target species, yellowfin, which was taken in the largest numbers during February and June though August.[239]

Correlations: The CIP researchers report that there were negative correlations between yellowfin and the other species taken, except bigeye. The correlation with swordfish was especially negative. The CIP researchers believe that this reflects the differing position that the species occupy in the water column.[240] In the case of swordfish, the timing of the sets during the day must have also been a major factor.

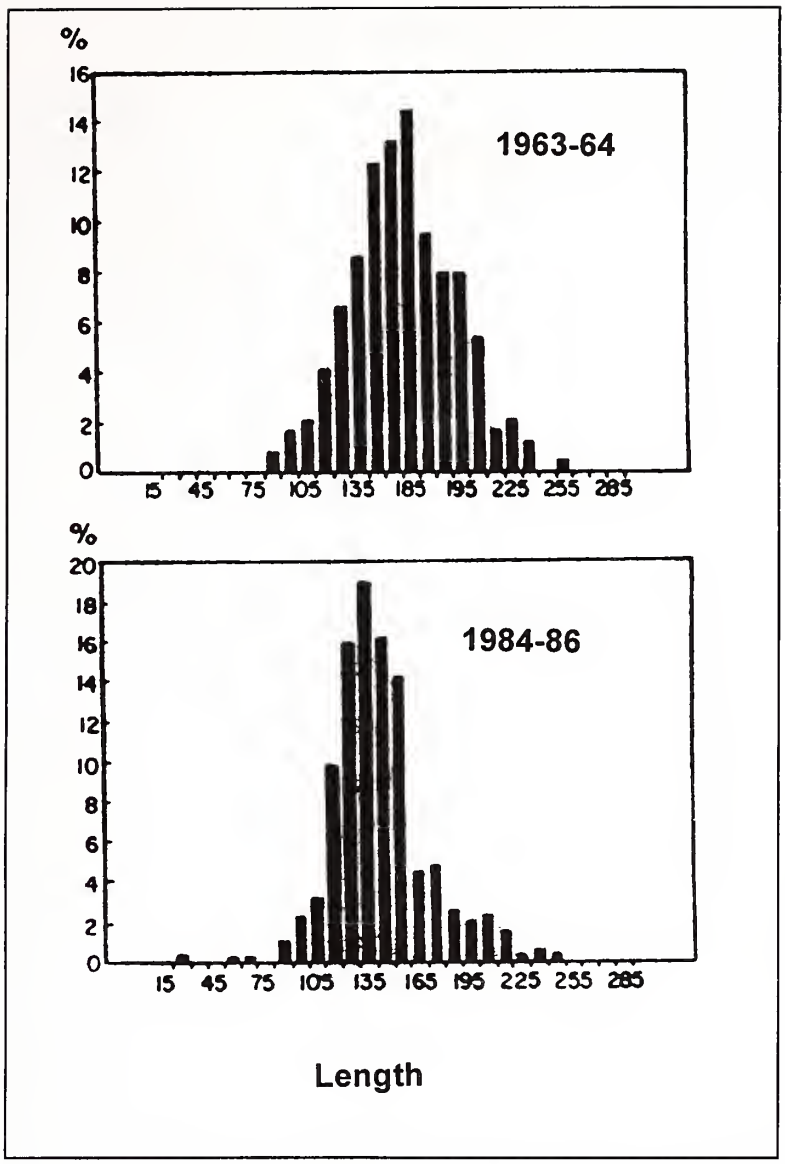

Figure 16.--Cuban researchers working in the 1960s and 80s have reported a decline in the size of the swordfish being taken by artisanal fishermen.

I. Stock structure

Most biologists believe that the swordfish in the north Atlantic are one large stock. There are, however, distinct regional differences, even between fish in relatively close areas. Biologists have noted significant differences between the fish harvested by Cuban artisanal fishermen in coastal waters off the island's northwestern coast, south of the Gulf Stream and the fish taken by U.S. fishermen only a few km away in the Florida Straits. The Cuban fish are reportedly smaller than those taken by U.S. fishermen in the Florida straits. This difference has been constant over a considerable period. One 1964 study indicated that nearly 65 percent of the Cuban fish were fish ≤100 lb (45 kg) dressed weight.[241] Florida fishermen report a substantially greater proportion of the larger size categories. Fish ≥200 lb (90 kg) were only 5 percent of the Cuban catch in comparison to 10 percent of the catch reported by the U.S. Florida fishermen.[242] Of course it is possible that size differences may be affected by fishing strategies or other factors associated with the fishery. In addition, there appears to be intense spawning activity west of Florida in the Gulf of Mexico as well as all along the U.S. Atlantic seaboard south of Cape Hatteras (Venezuela, figure 10).[243] The Cuban fish as mentioned appear to vary in maturation levels with the fish off northwestern Cuba appear to be generally immature (appendix B3b and figures 5 and 15).[244]

J. Stock status

1. Off Cuba

The authors have no current information on the status of swordfish off northwestern Cuba (figure 19).[245] These fish have been targeted by artisanal fishermen. Some data is available from the 1980s. Yield data collected by the Flota del Golfo (FG) indicated that the fishermen in the early 1980s (1981-84) reported slightly rising swordfish yields, but drastically falling billfish yields (appendix B1a2).[246] Another Cuban study noted that based on 1984-86 fishing data that the size of the swordfish had dropped significantly from that reported by researchers in 1964 (figure 16).[247] Another research group also reported that the fish they measured (appendix B3c) were much smaller than those assessed in 1964.[248] The decline in swordfish size appears most pronounced with females.[249] Cuban biologists speculate that the declining size may be related to a substantial increase in north Atlantic fishing pressure.[250] Cuban researchers in a 1988 article reported that the lengths of swordfish taken in the fishery around Cuba had not changed significantly during 1984-86.[251]

One worrying observation comes from research conducted at the University of Miami. One observer reports that when researchers first began sampling swordfish and billfish larvae in the Florida Straits during the 1950s that there were 10 swordfish larvae

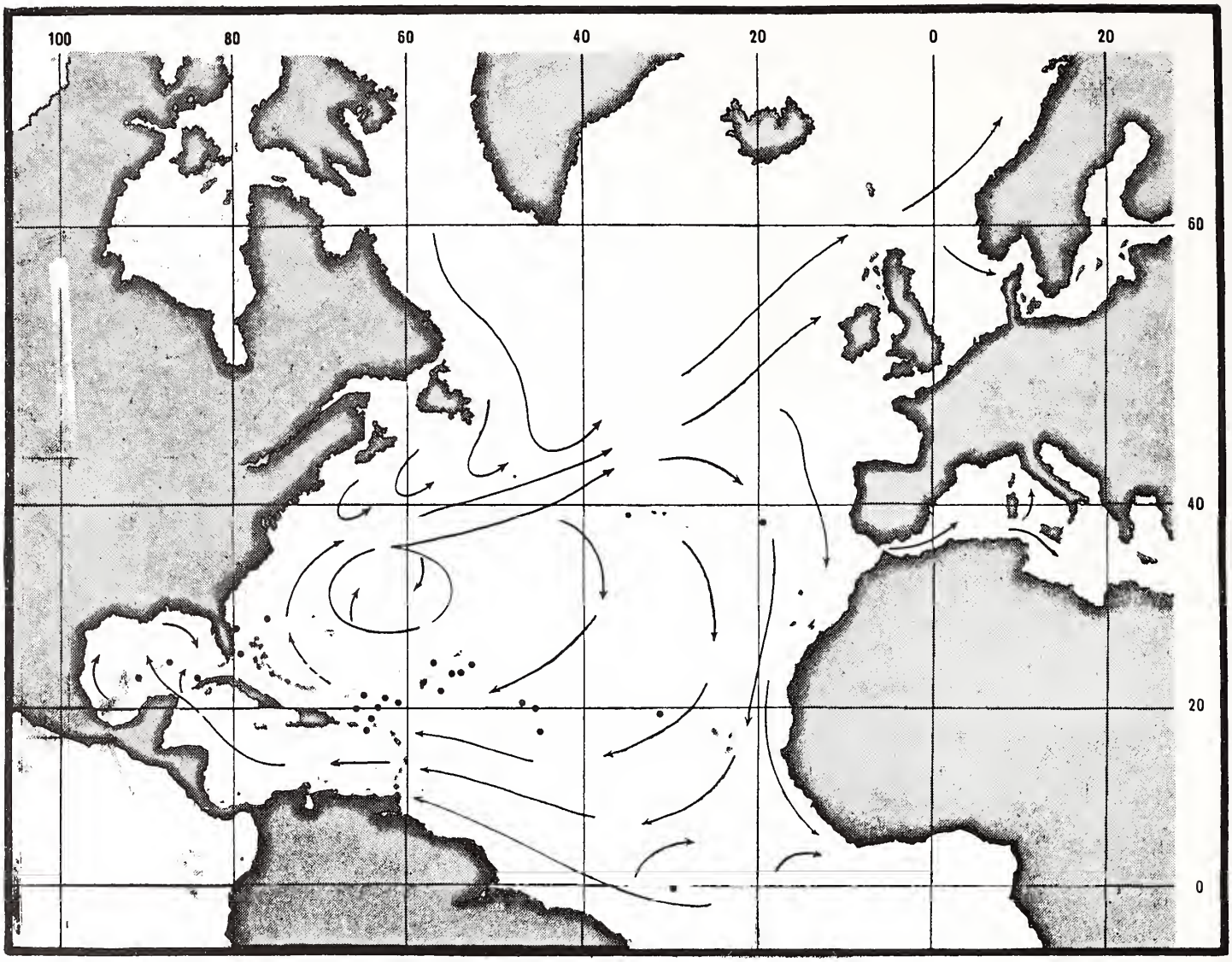

Figure 17.--A Cuban researcher in 1964 provided this view of north Atlantic currents. Dots indicated areas in which swordfish larvae have been found. Guitart

for every sailfish larvae. Current work suggests, however, that there are now 10 sailfish larvae for every swordfish larvae.[252]

2. Atlantic

Cuba researchers in analyzing the FAC catch data from 1973-85 made two observations concerning their operations in the tropical Atlantic.

Abundance: CIP researchers reported that swordfish abundance in the 1970s was essentially stable, but they observe an increase in the early and mid-1980s (1980-85). They noted that this increase coincided seasonally with falling yellowfin abundance.[253]

Sizes: CIP researchers noted a substantial decline in swordfish during the 1973-85 period. Swordfish were averaging 86 kg in 1973, but this had declined by more than 40 percent to only 40 kg by 1984.[254]

III. Grounds

The configuration and location of the island of Cuba provide fishermen with some of the most rewarding fishing grounds in the Caribbean. The immense area of shallow water south of Cuba supports important demersal fisheries, especially Cuba's valuable lobster fishery. There is, however, no fishing for large pelagics in these shallow areas. The small pelagic fishery has been primarily conducted off the southwest coast. The current flow structure around Cuba provide opportunities for fishermen targeting large pelagics, primarily along the western and northern coasts. Some more limited pelagic fishing has been reported off the eastern and southeastern coast.

A. Oceanography

1. Currents

The oceanic currents along the Cuban coast are highly varied and complex. The current pattern is quite different along the northern and southern coasts of the island.

North coast: The northern coast has a very narrow shelf and is relatively unprotected. The dominant inshore current flow at mid-year is easterly with currents of moderate intensity (<25 cm/sec). Generally in November the flow reverses.

South coast: The southern coast is much more sheltered than the northern coast. There is a large extension of shallow shelf and many islands of varying size affecting the current flow. At mid-year, strong currents (>25 cm/sec) flow from east to west across the southern coast outside of the Doce Leguas Keys. As in the north, however, this reverses by November. The primary current flows beyond the western extension of the island before heading north.[255]

Cuba has numerous counter currents and seasonal influences.

May-June: Strong current sweep around the western tip of the island and head north. The predominant current along the north central and eastern coast flows easterly and are not as strong as the currents along the western coast. The dominant current along the southern coast is westerly, although there are many counter currents and a substantially reduced flow over the shallow water and islands.

November: The current flow along the southern coast by November shifts to a predominantly easterly flow, but with complex counter currents especially around Doce Leguas. This southeasterly current flows around the eastern tip of Cuba.[256]

Water transport above the Caribbean sill is a highly complex mix of both north and south Atlantic water.

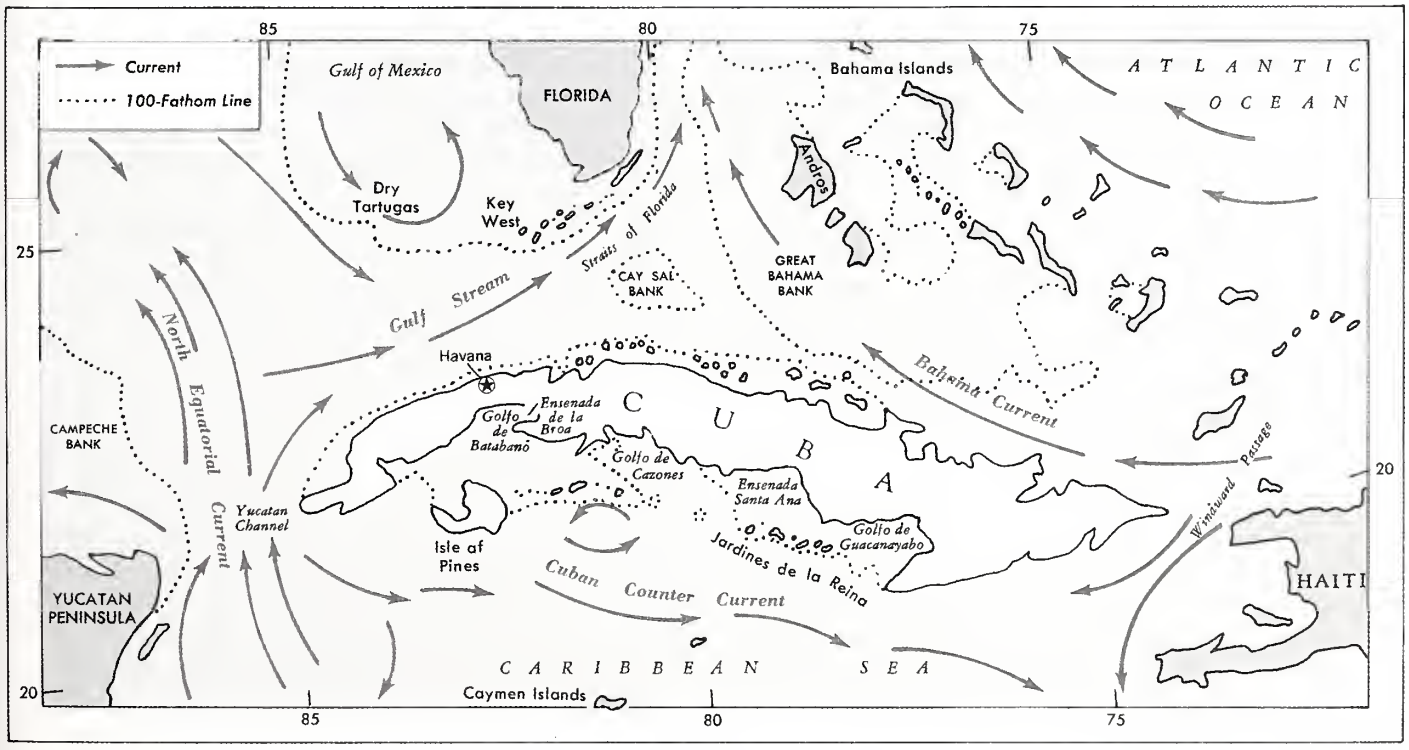

Figure 18.--Map of Cuba showing adjacent Caribbean passages and principal ocean current.

North Atlantic deep water is adverted from the Atlantic Ocean north of Cuba--through the Windward Passage and to a lesser extent the eastern passages, especially the Jungfern Passage near the USVI. Antarctic intermediate water is from the southern hemisphere and only enters the Caribbean through the eastern passages in the Lesser Antilles. Central water is adverted North Equatorial circulation, which includes the Gulf Stream circulation. It enters the Caribbean through both eastern and northern passages.[257]

Caribbean surface water is the advection of south Atlantic water, carried north by the northern Branch of the Brazil Current, mixing with the Amazon and Orinoco outflows.[258] It is carried into the Caribbean by the Guianas Current and through the Caribbean basins by the Caribbean Current to the exit point in the Yucatán Channel. The total transport through the Caribbean is well know as a result of detailed studies of the Florida straits. The relative importance of the eastern feeder passages is less well understood. The speed of the flow in the Caribbean Current increase as one moves west and is the highest in the Yucatán Channel off western Cuba.[259]

2. Basins

The Caribbean is composed of five contiguous basins inclosed by a sill formed by the Greater and Lesser Antilles. Two of the basins lie south of Cuba.
Yucatán Basin: The Caribbean Basin most associated with Cuba is the Yucatán Basin which is wedged south of western and central Cuba and east of Mexico's Yucatán Peninsula and Belize. Off western Cuba, a substantial shelf area in the Gulf of Batabano separates the coast and the deep-water of the Basin. The water in the Yucatán Basin off Cuba descends to about 4,300 meters.
Cayman Basin: The Cayman Basin, while smaller than the Yucatán Basin, has much deeper water, explaining why it is also called the Cayman Trench. It runs south of the Cayman Islands and, as a result, only borders the Cuban coast in the far east of the island. The water in the Cayman Basin off Cuba reaches depths of 7,200 meters.

3. Sea surface temperatures

Sea surface temperatures tend to range from about 25°-29°C along the northern coast. This is about 1°C cooler than surface temperatures along the southern coast. This difference is due to the current regime and large expanse of shallow water in the south which is influenced by the generally warm Caribbean water. The water around Doce Leguas along the southern coast can reach 30°C in the summer and fall to about 26°C in the winter.[260]

4. Fishery impact

Cuban fishermen are well situated to benefit from the narrowing and concentration of currents moving westward through the Caribbean which must exit through the Yucatán Channel. The Florida Straits are another concentration point. The Bahamas/Antillian Current[261] north of Cuba is also squeezed between the Bahamian and Cuban coast. In addition to these main oceanic currents, there are counter currents which help to circulate coastal waters and to distribute nutrient salts and organisms. At several locations, the interactions between the currents and counter currents tend to form eddies or whirlpools where important populations of food organisms gather and reproduce. Marine biologists believe that many migratory species like tuna, billfish, and swordfish tend to follow currents and thus a full understanding of the current structure is important to assessing the movement of these species.[262] Fishermen also have to take account of the currents operationally as longlines are significantly affected by the currents.[263]

Cuban fishermen have not fully taken advantage of opportunities for pelagic fisheries offered by the coastal current structure. Cuban fishermen have primarily focused on demersal fisheries which can be conducted with small boats in shallow coastal water. Coastal tuna fisheries have primarily been live-bait fisheries, often conducted along the protected southern coast. Cuban fishing in the rougher water of the Yucatán Channel and Florida straits has been very limited. The Cuban artisanal fishermen have never operated, for example, in the Yucatán Channel as the current is too strong. A few medium-sized longliners did attempt operations for a few years in the 1980s, but with limited success.[264] Interestingly, the primary commercial longline fishery conducted by Cuba during the 1960s-80s focused on large boats to be deployed on distant Atlantic grounds and were not suitable for coastal operations.

B. Topography

Cuba and its associated islands and cays have the largest land area in the Caribbean. Cuba itself is the largest and most westerly island of the Greater Antilles. Cuba and the other Antilles form a sill enclosing the five contiguous basins which comprise the Caribbean Sea. It is the largest island complex in the Caribbean. Cuba is about 1,200 km long and 100 km wide, although the width varies greatly--narrowing in the west. The total area is over 110,000 square kilometers. Much of the coast of the main island and even more of the offshore islands is still undeveloped.

One estimate suggests about 15 percent of the main island coast and less than 5 percent of the offshore island coast has been developed.

Photo 13.--The rugged mountains off Cuba's southeastern coast fall off steeply into the deep water of the Cayman Trench. Mark Grace

Despite the fact that Cuba is the largest island in the Antilles and by far the most important fishing nation, its Exclusive Economic Zone (EEZ) is in many areas quite limited by the overlapping zones of the several neighboring states. The Cuban EEZ is only about 370,000 square kilometers. The full extension of Cuba's 200-mile projection is severely limited by the neighboring countries, in some cases very small islands.

Given the size of the main island, the large number of islands and cays, many uninhabited, off the more protected southern coast are sometimes overlooked. The Isle of Pines is the largest of the many offshore Cuban islands. One Cuban count totals 2,128 islands and cays--depending on what size island/cay is counted. This makes Cuba the largest island system in the Caribbean. Only the Bahamas to the north has a comparably large island system, but the Bahamas is scattered over a larger area without a large, central dominant island like Cuba.

The insular shelf of Cuba provides a great variety of grounds with highly variable conditions.[265] Cuba's 3,200-km coastline is extensively indented with coves and bays. It is bordered with coral reefs and mangrove swamps. There are more than 280 white-sand beaches.

North: The shelf along the northern coast tends to be very narrow, in some areas extending less than 25 kilometers (km) offshore. The bottom falls off quite sharply, especially in the east to depths exceeding 2,800 meters. Sea conditions even close to shore can be quite rough--in contrast to the more placid southern coast. As a result, the fishery is somewhat seasonal and the demersal resources limited by the lack of available shelf. In addition, the EEZ projection is restricted by Bahamian claims to cays and banks that are closer to Cuba than the main Bahamian Islands. The U.S. EEZ further restricts the northern projection of the Cuban EEZ. Except for inshore islands most of the islands and cays north of Cuba are Bahamian. Cuba has only one significant group of islands off its northern coast, the Archipelago de Camagüey. It is located off the central coast to the south of the Bahamas Channel.

West: Given Cuba's elongated configuration there is only a narrow western coast. It does, however, include the area around the Yucatán Channel where foreign longline fishermen have found to be a productive area for setting their lines (figure 7).[266] There is a sizeable extension of Cuban waters into the Gulf of Mexico off the western coast, although limited somewhat by the U.S. possession of the Florida Keys and Dry Tortugas.

South: Cuba's southern coast provides extensive grounds for productive fishing and is the center of the country's valuable lobster fishery. Three large Gulfs (Batabano, Ana Maria, and Guacanayabo) provide a substantial area of shelf in comparison to the extremely narrow northern coast. These bays and other areas along the southern coast are studded with a large number of islands and cays in addition to the large Isla de Pinos--a former prison island. The Cubans have renamed it la Isla de Juventud (Youth Island) because of the wide range of boarding schools and youth programs conducted there. (Isla de Juventud is larger than almost all of the islands of the Lesser Antilles.) There are nearly 35,000 square km of shallow water less than 30 m deep off the southern coast with a coral reef ecosystem. This large area of shallow water and

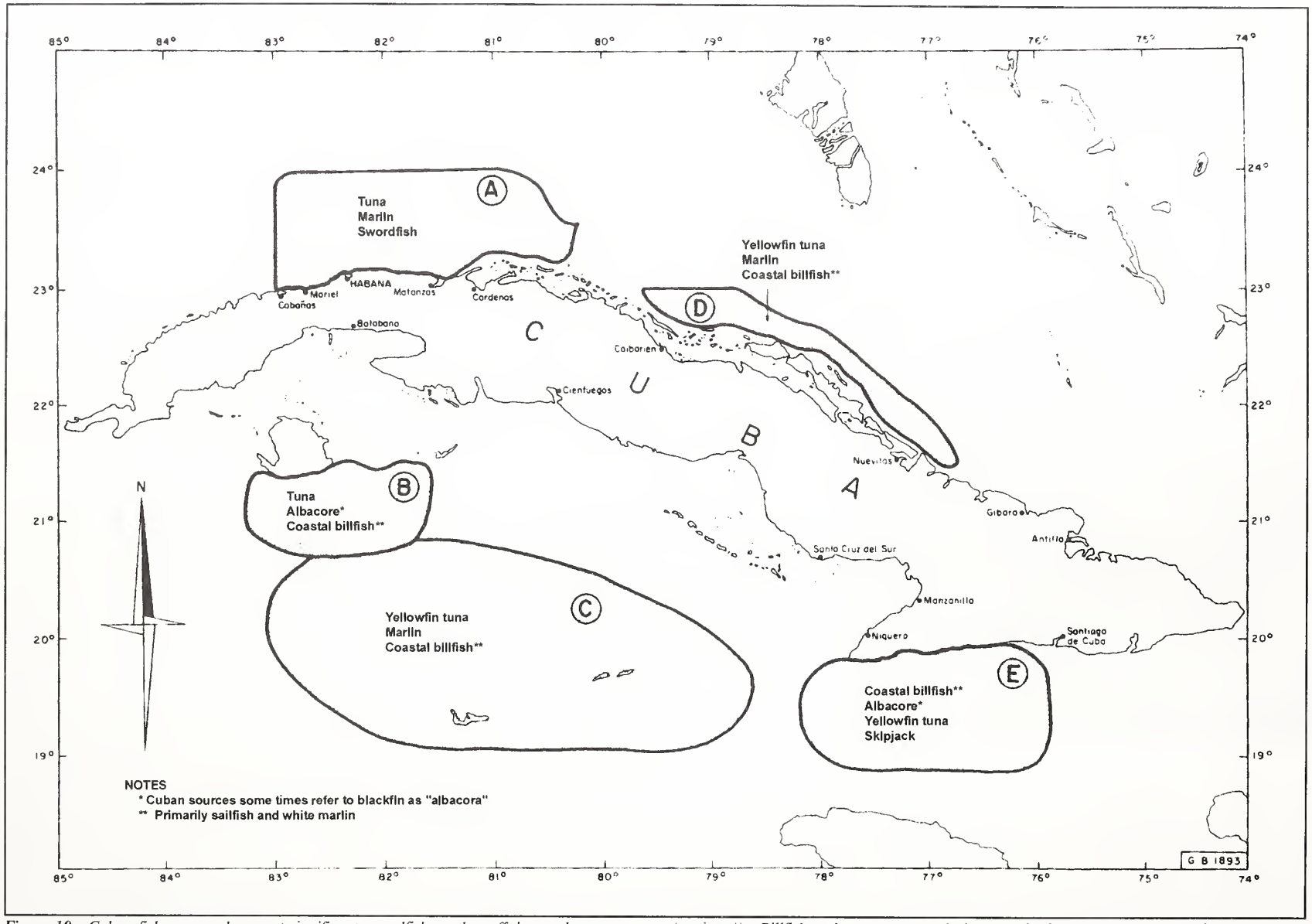

Figure 19.--Cuban fishermen only report significant swordfish catches off the northwestern coast (section A). Billfish and tunas are caught in several other coastal areas. Ichikawa

islands shields the southern coast from the prevailing currents. This is in sharp contrast to the northern coast where the full impact of the prevailing current is felt close to the coast. Interestingly the extreme eastern tip of the island abuts the Cayman Trench. The shelf there is extremely narrow falling off in only a few km to depths exceeding 7,000 m--the most precipitous descent in the Caribbean. The southern projection of Cuba's EEZ is limited by that of the Cayman Islands and Jamaica.

East: Again the configuration of Cuba provides a very small eastern coast, more correctly an eastern tip. The Windward Passage separates Cuba and Haiti and, like the areas around the Yucatán Channel and Florida Straits to the west, is a productive area for setting longlines (figure 7).

Much of Cuba is a rolling limestone plain. The median elevation is about 90 meters (m) above sea level. Mountainous areas cover only about one quarter of Cuba and are widely separated. Large areas of the island are thus suitable for agriculture. The most mountainous area is the rugged Sierra Maestra, which rises steeply from the southeastern coast to 1,980 m at Pico Turquino, the highest elevation on Cuba. Near the middle of the island there are other mountainous areas with elevations up to 1,160 meters. Cuba has about 900 short, sometimes swift rivers and streams. While small they are important transport systems for sediments and nutrients feeding into the island's coastal ecosystem. Seasonal flooding is common and can be a problem when hurricanes or heavy rainfall occur. Many dams have been built. Fish are being raised in the reservoirs. Pond aquaculture is being expanded, especially for tilapia. The impact of the altered water flow on the estuaries and inshore waters which act as critical marine habitat has not yet been assessed. It is a problem that Cuban officials are beginning to confront. There have been articles and documentaries aired on Cuban media about the ecological problems, for example, in the Río Cauto watershed. A plan to restore the area was launched by the Academy of Sciences in the late 1990s.[267]

C. Fishing grounds

1. Cuban

Cuba is the largest island in the Caribbean. Even so, it has a relatively small EEZ. This is due to its location close to both the United States and Mexico which limit the size of its EEZ to the west and northwest. Cuba's EEZ is even more severely limited by a number of neighboring islands. To the north the nearby Bahamas to the east Haiti, and to the south the Cayman Islands and Jamaica severely restrict the size of the Cuban EEZ. Measured in terms of a ratio with land area or population, Cuba has one of the smallest EEZs in the Caribbean. This in part explains the Cuban interest in developing distant-water fisheries. What is rather unexpected is to find the very limited Cuban activity in Caribbean grounds outside their EEZ. Much of the Cuban distant-water fishing has taken in the eastern and central Atlantic at equatorial latitudes, but operations in north and south Atlantic and the eastern Pacific were also important.

a. Artisanal longlining

Cuba first deployed artisanal longlines in a fishery off the northwest coast targeting swordfish and billfish. Cuba has since deployed artisanal bottom longlines for

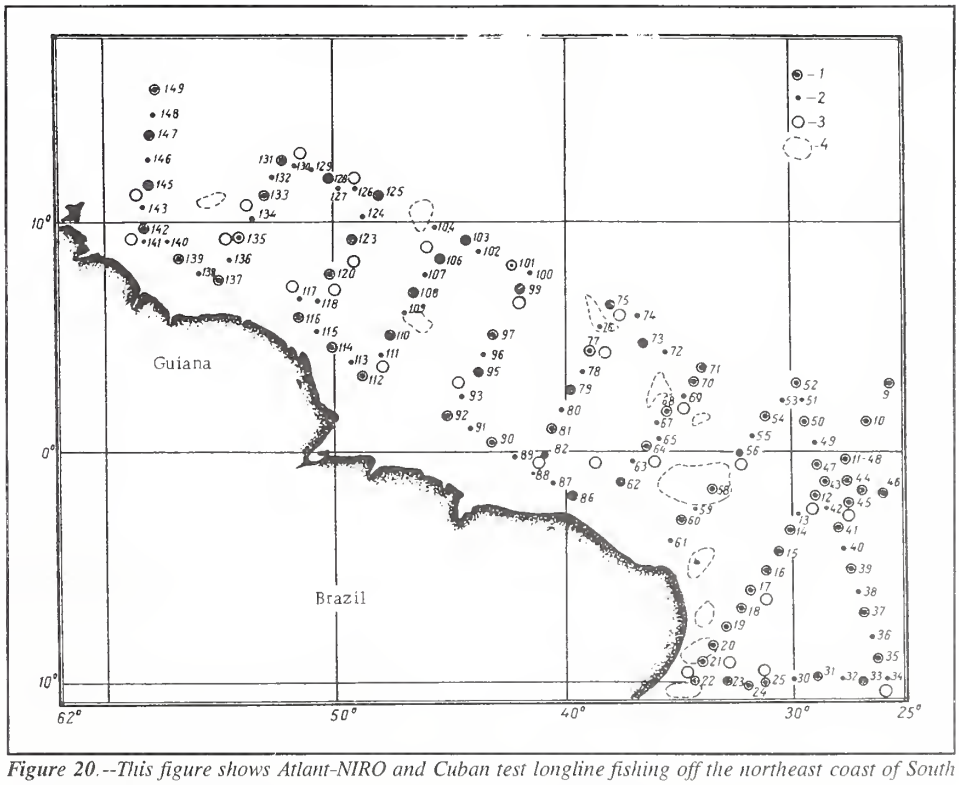

Figure 20.--This figure shows Atlant-NIRO and Cuban test longline fishing off the northeast coast of South America during 1963. The Soviets like the Cubans were seeking to initiate a tuna fishery. Zharov

grounds on the Campeche Banks off Mexico and at various sites all along the Cuban coast.

Northwest coast: The Cuban artisanal swordfish fishery is primarily conducted with small longlines off the islands northwestern coast in coastal waters.[268] The Gulf of Mexico is an important fishing ground for U.S. longline fishermen targeting swordfish and tunas (figure 7). The Cuban artisanal longline fishery, however, appears to have been largely conducted fairly close to the coast, albeit in blue water off the shelf.[269] Tuna, sharks, and billfish appear to occur at different locations around the island, but swordfish are primarily found off the northwestern coast (figure 19). One Cuban estimate indicates that during the 1960s, 70s, and early 80s, Cuban artisanal fishermen landed on average about 220 t of swordfish and 130 t of billfish. About 70 percent of that catch was taken off the northwestern coast.[270] This fishery has since diminished significantly. Fishermen only report a 5 t catch in 1999 (appendix C8a). The artisanal vessels varied in size. Many were quite small craft and Cuban fishermen have never operated in the Yucatán Channel where conditions can be much rougher than the sheltered coastal waters more suitable for their boats.[271] The last report that the authors have found on these artisanal longline fisheries was published in 1989. [272] Cuban researchers report that there have been such more recent studies.[273]

Campeche Banks: Cuba has deployed two types of bottom longlines on the Campeche Banks. One for snapper/grouper and the other for shark. Mexico declared a 200-mile zone in 1976 and restricted Cuban fishing, but annually gives Cuba a small grouper allocation.

Other coastal grounds: In addition to pelagic longlining for swordfish and billfish off the northwest coast, artisanal fishermen worked in other areas. One observer reports increased activity off both the northeastern and northwestern coast in 1984-85.[274]

Artisanal fishermen also deployed demersal longlines which they set both in coastal and offshore waters. Sharks are heavily targeted.[275] Rays are abundant along the coast in muddy bottom.[276] The authors note that the Cubans now report only small swordfish catches (appendix C8a), but substantial shark and ray catches (appendix C2a2b and C11a). U.S. pelagic longline fishermen in the Gulf of Mexico also notably report substantial shark and ray catches (appendix F1b). Some pelagic longlining also occurs in coastal areas other than the northeast coast. Some authors describe this activity as primarily focusing on shark. We do note that a cooperative research cruise conducted by U.S., Mexican, and Cuba researchers to assess shark, did encounter swordfish off the eastern coast.[277] Demersal longlining for coastal sharks, groupers, and other species occur all along the coast. The sets for shark tend to be in deeper water.[278]

b. Commercial longlining

Cuban fleet managers gave considerable attention as to where the new commercial longline fleet they purchased in the 1960s should be deployed. Some research and test fishing was a carried out with the Soviets. Cuban fleet officials also considered the data reported by Japanese fishermen. Cuban captains never found the limited data compiled with the Soviets very useful. They did, however, extensively use data compiled by the Japanese in selecting fishing grounds.[279] This was in part facilitated by the presence of Japanese fishing masters on the Cuban longliners. The Cubans deployed their longliners in the western Atlantic at various latitudes for a few years. Fleet managers finally decided on the equatorial Atlantic, primarily in the Gulf of Guinea and the central equatorial Atlantic.

1) Cuban waters

Cuban waters were not deemed appropriate for the country's new commercial tuna longline fleet. There was initially some fishing in coastal waters and that of

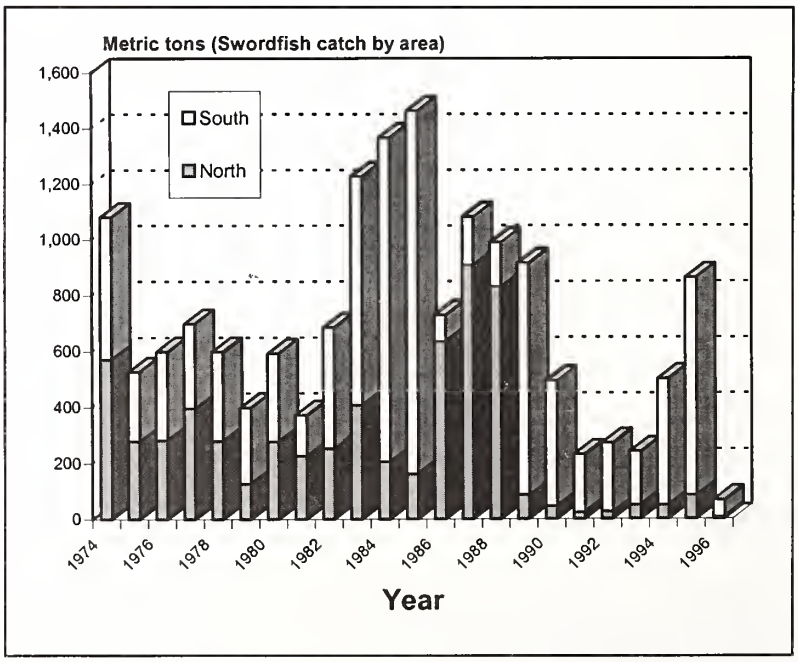

Figure 21.--Cuban longliners were deployed in both the north (north of 5°N) and south Atlantic, but mostly at equatorial latitudes.

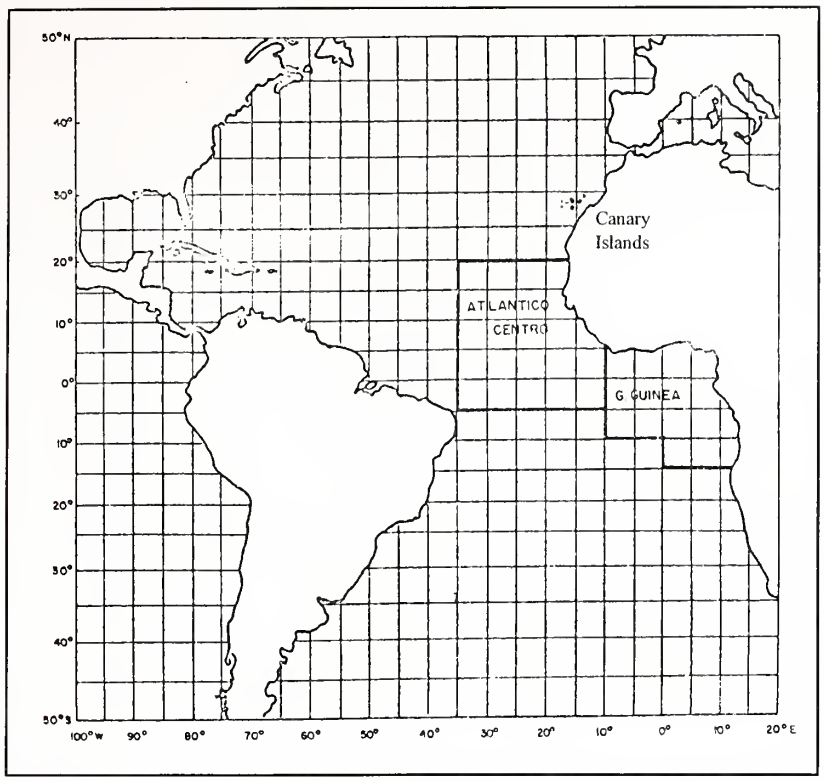

Figure 22.--Most of the Cuban tuna and swordfish catch was reported in the eastern Atlantic, either in the Gulf of Guinea or the central Atlantic between Africa and South America.

neighboring Caribbean countries. As Cuba began acquiring its new commercial longliners (appendix A4a), they were deployed on more productive distant-water grounds. The large longliners acquired dwarfed the small craft artisanal fishermen operated in coastal waters. Catch rates were simply not high enough to support the costly operations of these vessels. Cuba in the 1980s did attempt to expand the longline fishery for tunas and swordfish off the northeast and southeast coast using the ports of Gibara and Santiago de Cuba.[280] Medium-sized longliners were deployed in the mid-1980s for a few years (appendix A1). One report notes catches up to 700 t, mostly of yellowfin.[281] We have few, details on how successful this proved, although the fact that the fishery was only active for a few years suggests that it was not very successful.

2) Distant water

a) Longline grounds

The development of a distant-water longline fleet was an early priority for Cuban fishery officials. The Cuban commercial longliners were initially deployed in the Caribbean and western Atlantic north and south of the Caribbean (figure 23). The initial deployment were grounds in the Caribbean, Gulf of Mexico, north of the Bahamas, and off Brazil.[282] The Centro de Investigaciones Pesqueros (CIP) devoted considerable attention to determining the most productive fishing ground. The CIP studied Japanese data and participated in a few research cruises with the Soviets.[283] The Soviets at the time were collecting data for their own tuna fishery. They had no experience with tuna fishing themselves. The longlines deployed by the Soviet research vessels were very short. Short lines were used because these were exploratory operations and because neither the Soviets or Cubans had the experience to operate longer lines. Cuban researchers did not believe that they returned reliable data.[284] The Cubans had more confidence in the data developed by the Japanese. The CIP prepared a detailed plan for the Cuban fleet.[285] This subsequently became a routine function for the CIP.[286] Cuban vessels by 1963 were working nearby Caribbean grounds as well as grounds off South America (figure 23). After the first few years, however, Cuban officials decided that the commercial longline fleet could best be deployed in the equatorial Atlantic, both in the Gulf of Guinea and the central Atlantic.

The Cuban longline fishery was conducted in both the north and south Atlantic, but virtually all at equatorial latitudes between 20°N-10°S and 85°W east to the African coast.[287] The primary Cuban longline grounds have been in the central and eastern Atlantic off northwestern Africa, especially in the Gulf of Guinea.[288] The authors have no details on why the eastern Atlantic and Gulf of Guinea off West Africa rather than the nearby Caribbean. Cuban officials made a commercial decision to focus on the equatorial Atlantic because of higher catch rates. The data available from Japanese fishermen as well as early fishing results were the deciding factors. The initial planning period clearly relied heavily on Japanese fishing data.[289] Cuban researchers subsequently continued their focus on the equatorial Atlantic.[290]

Information on the specific Cuban longline grounds is as follows. The Cuban commercial longline fleet was primarily deployed in the equatorial Atlantic, operating in both the north and south Atlantic. Only limited fishing is conducted in the western Atlantic, although artisanal longliners have operated off Cuba's northwestern coast. ICCAT and FAO differ as to how

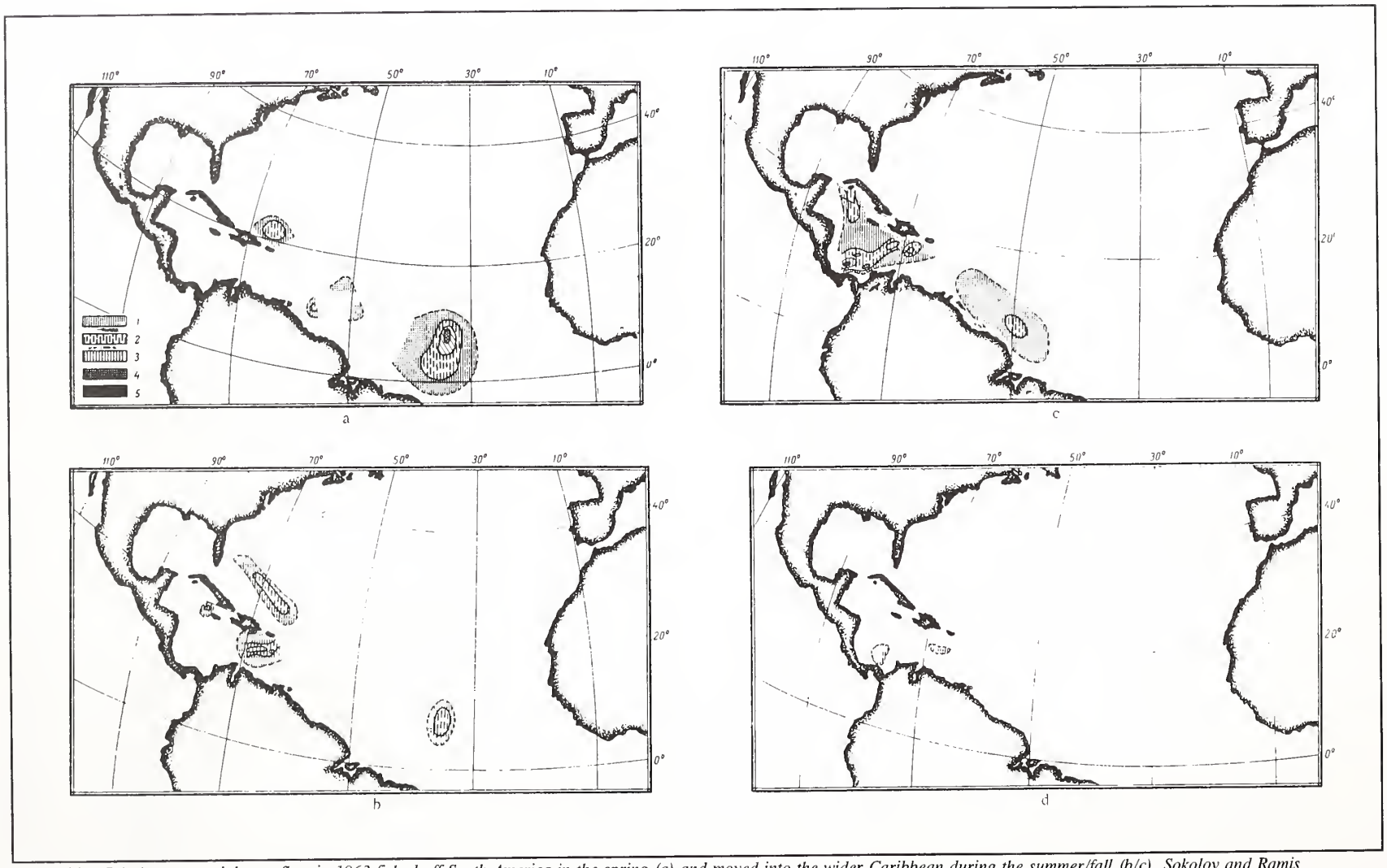

Figure 23.--Cuba's commercial tuna fleet in 1963 fished off South America in the spring (a) and moved into the wider-Caribbean during the summer/fall (b/c). Sokolov and Ramis

they compile data. ICCAT compiles data on the basis of a north/south statistical areas while Cuban catches fall mostly into east/west FAO statistical areas. The authors note, however, that because of the location of the two zones fished (figure 22), there is both a north-south and east-west dimension to statistical comparisons.

North/South Atlantic: ICCAT data shows Cuban catches divided between the north and south Atlantic. This is somewhat misleading as the Cuban catch was in fact during most years taken in a narrow equatorial band encompassing areas within both the north and south Atlantic. The dividing line for the ICCAT data is 5°N, not the equator. In most years, fishing activity in the two areas was comparable with larger catches being reported in the north or south in different years. Beginning about 1982, larger catches began to be reported consistently in the south Atlantic (appendix C8b). Cuba reported especially large catches in the south Atlantic during 1983-85. This was followed by 3 years of fishing in the north Atlantic, 1983-85 before returning to the south Atlantic. The authors believe that yields were the primary factor involved. The Cubans had access to some West African ports as well as Las Palmas in the Canary Islands. There were complications further north where the Moroccan Air Force attacked Cuban vessels venturing very close to the coast of the Western Sahara (former Spanish Sahara). This was north of the area where the FAC longliners were deployed. (See: "VII. Catch: 1980".)

Eastern Atlantic: Cuban researchers often divide their eastern Atlantic grounds into two separate areas. The first is the central Atlantic (25°N by 5°S and 35°W by 10°W) which included coastal areas off northwest Africa. The second primary area was the Gulf of Guinea (the west African coast at about the equator by 10/15°S and 10°W by 10°E) which included coastal areas off western Africa south as far as Angolan waters (figures 22 and 41).[291] Cuban longliners did not normally operate north of 20°N. Tankers servicing the longliners are know to have operated off the coast of the Western Sahara.[292] This was an area north of where the FAC longliners operated, although, individual boats were occasionally sent into new areas outside the normal grounds for test fishing. Cuban effort has varied in the two eastern Atlantic grounds. The target species was yellowfin tuna.[293] Cuban reports indicate that effort and catches have in different years been concentrated in both zones. Researchers indicate that fluctuations in the central Atlantic ground are the greatest and that at times there has been high hook rates and fishing intensity there. Effort during the 1970s was fairly stable in the Gulf of Guinea, but there were very sizeable annual variations in the Cuban effort deployed in the central Atlantic.[294] The Cuban fleet during the late 1980s apparently shifted target species. Effort varied greatly from year to year, but increasingly small catches were reported. Small catches were reported through 1996 (appendix C1a2b).

Western Atlantic: Cuba has reported less effort, but important in some years, in the Western Atlantic. The Cuban longliners have fished off the U.S. eastern coast north of the Bahamas and as far south as the Brazilian coast. Soviet research vessels and fishing vessels were used for test fishing to determine the appropriate grounds.[295] Cuban sources indicate that the test fishing mostly served to prepare for a possible Soviet longline fishery and the results had little impact on Cuban distant-water operations. Operations off the coast of South America were severely curtailed by the late 1970s after coastal states declared 200-mile zones. There has been some longlining in the wider-Caribbean beginning in the 1970s, but it has been very limited (appendix C8f).[296] Cuban Caribbean longline effort has been appreciable in only a few years.[297] Great care must be used in assessing available FAO data showing the swordfish catch by fishing area (appendix C8d1). This data shows that much of the Cuban commercial swordfish catch was taken in eastern central Atlantic (FAO area 34 and figure 54). Cuban sources report, however, that swordfish abundance was higher notably in the western Atlantic and that the Cubans used the same gear and methods in both areas.[298] This apparent discrepancy may in part be due to the fact that the Cubans were targeting yellowfin with daytime sets. If they had been targeting swordfish with evening sets the data may have been substantially different. A variety of other statistical problems may be involved.

b) Bilateral access

FCP and the FAC conduct Cuba's primary distant-water operations. FCP has deployed vessels in groundfish fisheries off Namibia and Canada and in mid-water trawl fisheries for jack mackerel and other species off Peru and Chile. These operations during the 1980s accounted for the bulk of the Cuban fisheries catch (appendix C1a2a). The FAC, Cuba's tuna fleet, also conducted some distant-water operations, in the tropical Atlantic from a support base in the Canary Islands (figures 22 and 41). Cuba closed its Canaries base during the 1980s as an economy measure. A variety of small fishery activities have also been conducted with various Latin American countries.[299]

Cuban foreign fishery relations with other countries have primarily focused on efforts to obtain access to coastal fishing grounds. Cuban officials have been especially active in Angola, Canada, Guyana, Namibia, Peru, and other countries, with varying degrees of

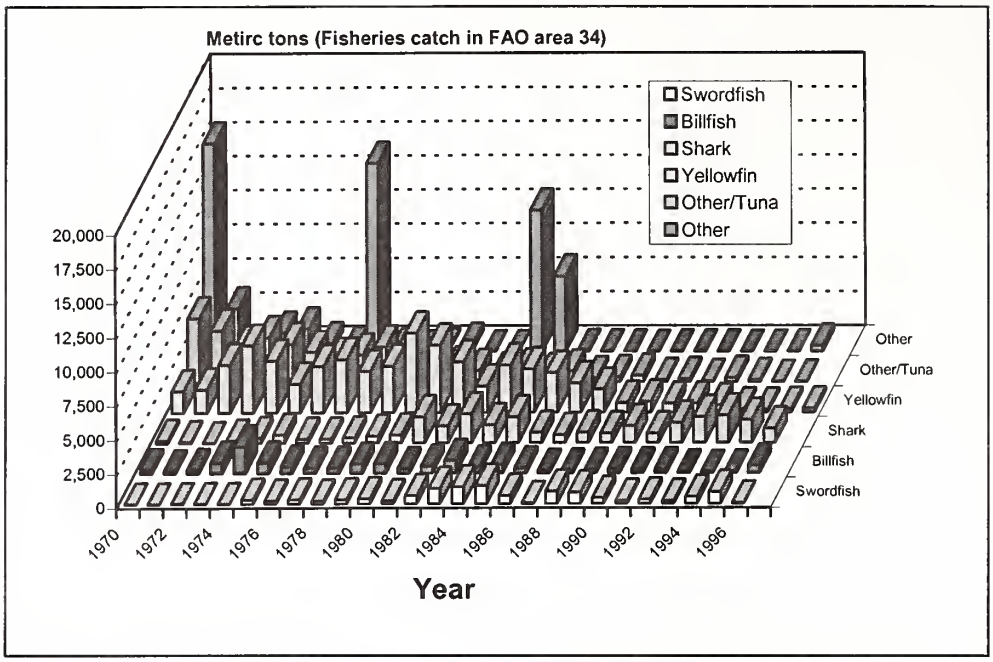

Figure 24.--The Cubans primarily targeted tunas in the eastern central Atlantic (FAO area 34), but by the 1990s were reporting mostly shark and very little tuna.

success. Available details on relations with other countries include primarily information on Cuban efforts to obtain access to demersal resources or pelagic fisheries like jack mackerel for which trawlers were deployed. This was primarily because trawl fishery were mostly conducted in coastal waters and were more likely to need the consent of the coastal countries.

The authors have been able to find much less information concerning the foreign relations associated with FAC longline fisheries. This is largely because the operations were often conducted on the highseas outside 200-mile EEZs. In contrast to the trawling operations, longline operations were feasible on the highseas and thus conducted in areas not surveiled by African countries. A Cuban estimate suggests that 90 percent of the FAC distant-water longline sets were made in international waters.[300] One observer believes that the cost of access fees would have made the fishery to costly to conduct.[301] Another observer believes, however, that there was also less news coverage on Cuba activities from the West African countries off which the Cubans operated. Available information on bilateral relations with these countries is discussed in "XVI. International: A. International Relations".

2. Foreign

Cuba because of its security concerns and desire to strictly control the population and emigration of Cuban nationals, has a significant enforcement capability. Cuban waters are probably more intensely patrolled than any other Caribbean island's waters, although the high cost of mostly imported fuel, since the Soviet oil subsidy was ended in 1992, does limit actual patrols. Cuba does not license foreign fishermen, other than recreational fishermen. Their patrol capability would seem to suggest that there is little or no foreign fishing. Some foreign fishing does, however, occur in an around the Cuban EEZ. Details on foreign vessel operations off Cuba are described in detail in "XVI. International: A. International relations".

Japan: One Cuban source indicates that the Japanese in the mid-1980s were received permission to fish in Cuban waters and did deploy a few longliners. Their primary interest was reportedly bluefin.[302] The Japanese had been fishing bluefin in U.S. waters, especially the Gulf of Mexico.

Taiwan: There have also been sightings of Taiwan longliners operating in Cuban waters beginning in the late 1990s.[303] No details are available on these operations.

United States: U.S. fishermen do report sets around both the Yucatán Channel and Windward Passage (figure 7).[304] Good swordfish catches are reported in these areas, although results vary from year to year. Actually U.S. fishermen currently report fishing in Cuban waters, but not Mexican waters around the Yucatán Channel. (See "XVII. Enforcement").

IV. Fleet

A. Fleet Overview

Cuba has operated both a commercial and artisanal longline fleet. The commercial fleet was built in the 1960s at considerable cost in Spanish shipyards. The vessels were large modern longliners, some with hold capacities exceeding 300 tons and autonomies of up to 100-105 days. The FAC also converted 9-13 shrimp trawlers into medium-sized longliners. The large Spanish-built longliners and other distant-water vessels were used to showcase the development of a modern fishing industry in Cuba. The longliners, however, proved so expensive to operate that plans to build vessel had to be canceled. Officials had concluded that they were not very productive.[305] Even so, the Cubans continued operating the commercial longliners for nearly 3 decades at considerable cost.[306] Plans to diversify the fishery by initiating a tuna purseseine fishery in the 1970s proved unsuccessful. This was not due to any lack of interest on the part of the Cubans who ordered 16 medium-sized seiners from Peruvian shipyards.[307] The Peruvian yards reported continued delays and cost over-runs. Finally the Cubans canceled the order.[308] The Cubans continued operating the FAC longliners until the 1990s when the Russians stopped subsidized fuel deliveries. The artisanal fishery deployed both pelagic and demersal longliners. The pelagic longliners targeting swordfish were small boats of varying design deployed along the northwestern coast.

1. Commercial fishing fleet

Cuba during the 1960s and 70s built, in Caribbean terms, a large commercial fishing fleet. The fleet included both imported distant-water and domestically built commercial vessels.[309] Cuba reported a high-seas fleet consisting of 68 vessels totaling nearly 109,000 GRT to Lloyd's in 1992. Most of the large Cuban distant-water vessels were operated by FCP, the state-owned distant-water fleet. Nearly half of those vessels were 2,000 GRT or larger. The U.S. Office of Naval Intelligence indicates that Cuba in 1993 had a fleet of almost 80 large fishing vessels totaling nearly 140,000 GRT.[310] This did not include the large fleet of support vessels (tankers and cargo vessels) FCP required for its distant-water operations. Data published by FAO provided additional fleet estimates through 1989.[311]

While Cuban fleet estimates vary, it is clear that the Cuban distant-water fleet in the 1970s and to a lesser extent in the 1980s was the largest operated by any Latin American country. Many of the most productive vessels were *Río Damuji* class stern factory trawlers. These vessels comprised the biggest fleet of large vessels operated by any Latin American country.[312] While the Cuban fleet was the largest such fleet in Latin America, as discussed in the Overview of this report, it was not the most profitable and its operations were dependent on Soviet oil deliveries. Even before the collapse of the Soviet Union in 1991 and the end of Soviet subsidies, other countries in the region were surpassing Cuba (especially Argentina and Chile) in fleet capacity.[313] More importantly, these other fleets were profitable.

2. Longliners

Cuba began acquiring its first commercial longliners in 1961-62. Even though the initial results were disappointing, Cuba proceeded to eventually acquire a fleet of 26 commercial longliners (appendix A4b). Most of these longliners were built at considerable cost in Spanish shipyards. One source estimates that the Spanish order alone was more than $30 million which in the mid 1960s was a considerable amount of money.[314] Cuban planners initially purchase some used vessels. The vessels varied in size and range and were different classes. Some of these

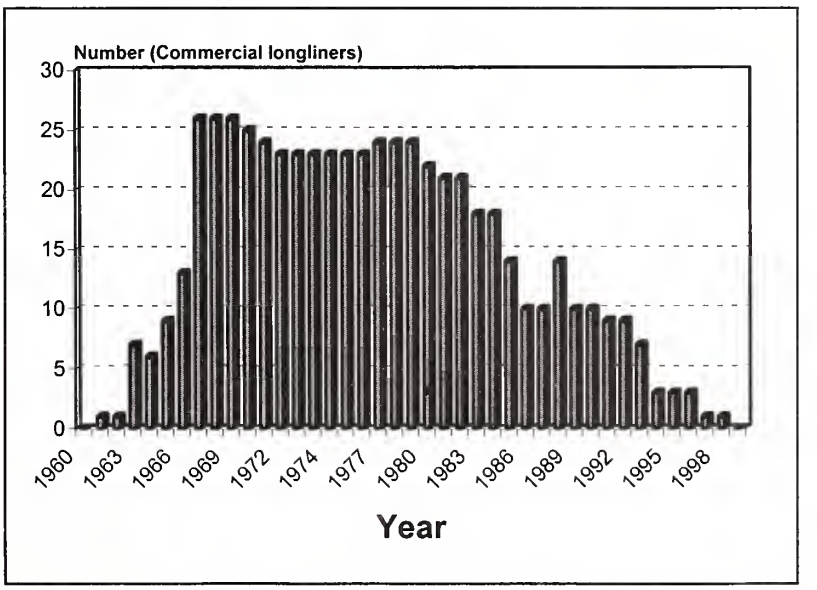

Figure 25.--Cuba built a fleet of 26 large, commercial longliners at considerable cost in foreign shipyards. After 1967, however, no new longliners were added to the fleet.

were used vessels which some Cuban captains thought were quite serviceable.[315] Planners decided, however, against the less costly alternative of purchasing used longliners and decided to order the construction of brand new vessels in Spain. The major component of the fleet were Anchoa-class longliners built in Spain during 1965-67 (appendix A4a).[316] The anticipated production with the original longliners was not achieved.[317] Results with the Anchoa-class longliners were also disappointing (appendix A9). Cuban officials had planned to build an additional 43 large longliners (appendix A4b). Plans were drawn up to use these new vessels for significantly expanding tuna longline operations (appendix A6a). The construction of the additional longliners, however, were eventually canceled (appendix A4b). Given the disappointing production and high operating costs, Cuban officials decided not to proceed with the planned purchases. In fact, Cuba has not since the 1960s added any new commercial longliners to its fleet, an indication as to just how disappointing actual operations proved. They did, however, continue to operate their fleet of expensive imported longliners even though production did not cover operating costs.

3. Inactivated

The Cuban decision to initiate a distant-water fishery was based primarily on the Soviet experience and the availability of inexpensive, Soviet-supplied fuel. The decision to use scarce foreign exchange reserves to purchase longliners and factory trawlers in foreign shipyards was made in the early 1970s before Cuban officials fully appreciated the impact that the increasing prevalence of national 200-mile coastal zones would have on distant-water fisheries. As a result, the Cubans found themselves by the late 1970s with an expensive distant-water fleet, dependent on subsidized fuel, and rapidly shrinking access to coastal grounds on which the fleet could be deployed.[318] Worst still, Cuban officials found that the fleet was much less productive than had been anticipated (appendix A9). Orders for additional vessels were canceled (appendix A4b). No longliners were added to the fleet after 1967. Cuban officials operated the distant-water fleet during the 1970s and 80s, even though production did not cover operating costs.

Cuba found itself by the early 1990s in the Período Especial with an increasingly aging fleet. All of the fleet was built in the 1960s and 1970s. The newest Cuban fishing vessels were the Rio Damuji class *Río Yateras* built in 1975-79.[319] The authors know of no large fishing vessels added to the Cuban fleet since 1979. Maintenance costs for such old vessels were escalating.[320] Many had engines which were not as fuel efficient as modern engines. Given the Soviet oil subsidy, Cuban officials had not given as much attention to fuel efficiency as was the case of fishermen in market economies. This became, however, a critical problem for FCP when the Soviet oil subsidy was curtailed and then terminated. A Bermuda company leasing a Cuban longliner in 1998 found the vessel in poor condition and very expensive to maintain.[321] Growing maintenance and fuel difficulties, as well as continued access difficulties, apparently became insolvable problems.

The Cuban distant-water fisheries catch is a good indicator of the status of the fleet. Cuban distant-water catches nearly reached an all-time record of nearly 150,000 t by 1986, reporting operations off Canada, West Africa, southern Africa, Argentina, and Peru (appendix C1a2a). These distant-water operations were subsequently curtailed and eventually closed: southern Africa and Argentina (1991), Peru (1993), and West Africa (1997). Only off Canada have the Cubans continued distant-water operations (appendix C1a2b). The catch dropped to only 90,000 t in 1991 and only a little over 30,000 t in 1992. The distant-water catch in 1998 was a mere 8 t, all taken in the northwest Atlantic off Canada.

4. Current status

The authors have no details on the current status of the Cuban fleet. Most of the fleet was idled in 1992 when the Soviet oil subsidy was terminated with the dissolution of the Soviet Union. One report from Cuba indicates that the longliners were mostly sold off or used for other purposes.[322] The authors believe that the same has occurred with the distant-water trawlers. As there are few alternative uses for these dedicated fishing vessels, they have probably mostly been sold--perhaps for scrap. The authors stress, however, that precise details on the disposition of the Cuban vessels simply are not available.

5. Replacement vessels

Cuban officials made several efforts to acquire new vessels in the 1970s-80s. One of the most frustrating was an effort to build a fleet of 16 medium size purseseiners in Peru to launch a tuna fishery. The Peruvian shipyards experienced a series of delays and cost overruns. Cuba eventually canceled the contact.[323] Other projects to replace aging vessels during the 1980s were also unsuccessful in the 1980s.

Cuban officials in the 1990s have been faced with a different set of circumstances. While FCP/FAC operations appear to have ended, Cuba appears to have

arranged for a variety of joint-venture operations.

FCP/FAC: Cuba's distant-water fishery has for all intents and purposes ended, except for limited operations off Canada. The distant-water fleet purchased in the 1960s and 70s was mostly idled or sold. Most of the remaining idled vessels by 2000 had been inactive for 4-10 years and would require extensive, costly overalls to be put back into service. Officials had to decide if the country still wants to pursue a distant-water fishery.

Joint ventures: Scattered press reports suggest that the Cubans have decided to continue operating a small distant-water fleet, primary distant-water trawlers. It is unclear to the authors where the financing has come from for the acquisition of new vessels, but apparently a variety of joint venture arrangements are providing the needed funds. These developments are discussed in the "I. Overview: B 13. Future distant-water operations" section of this report.

Photo 14.--Despite the substantial investment in commercial longliners, FCP/FAC never succeeded in operating them profitably. Production of valuable species proved far less than anticipated.

B. Longline fleet chronology

Cuba's commercial longline fleet has primarily been deployed by the Cuban Government since the 1959 Revolution. There are reports of Cuban longliners targeting swordfish during the 1950s, but these were relatively small artisanal boats. The Cubans adopted a great deal of Russian technology and fishing strategy for their trawlers. The Soviets did not, however, have an important longline fleet. As a result, Cuban officials turned primarily to Spanish and Japanese shipyards for their commercial longline fleet--despite the need to use hard currency. About 26 longliners were actually built in foreign shipyards during the early and mid-1960s and delivered to FCP. Plans called for the construction of 43 additional large commercial longliners. The disappointing results achieved by the first 26 longliners, however, forced the Cubans to cancel the additional construction contract (appendix A4b). FCP/FAC has not ordered any additional longliners since the mid-1960s--an indication of how unprofitable the Cuban commercial fishery proved. Despite the low productivity of their longliners, Cuban managers continued to operate them.[324]

Available chronological information on fleet plans is as follows.

1950s: Scattered reports indicate that Cuban fishermen operated a few longliners for swordfish during the 1950s.[325] The authors believe that the vessels were small boats deployed in the artisanal fishery off northwestern Cuba, but have no detailed description of the boats. Cuba's principal tuna fleet during the 1950s was their bait boat or bonito fleet, one of Cuba's few commercial fleets.[326]

1957: A 49.5 m Japanese longliner, the *Sumiyoshi Maru* was contracted in 1957 to do test fishing and train Cuban personnel. The Japanese longliner was capable of deploying a 100-km longline. They conducted a 62-day fishing campaign.

1960: The Revolutionary Government from a very early period conceived of the idea of initialing a modern longline fleet. The restructuring of the Centro de Investigaciones Pesqueras (CIP) research plan after the Revolution was completed in December 1960 and included a project for the possible development of a tuna fishery. At the time they were primarily assessing western Atlantic grounds. The Cubans were especially interested in the Gulf of Mexico where large tunas were being taken.[327]

1961: Cuba decided to initiate a commercial tuna fishery in 1961. The Cuban fleet deployed its first commercial longliner in 1961.

1962: Cuba officials traveled to Japan to discuss fishery development plans with Japanese officials.[328] Other meetings were held in Spain with Spanish officials. The Cubans subsequently ordered longliners from Japanese and Spanish shipyards. The CIP initiated a major research program. Some research was done cooperatively with the Soviets, but the Cubans primarily relied on research and catch data compiled by the Japanese and other Asian longline fishermen operating in the Atlantic to support the new fleet. Extensive research was conducted to determine the best fishing zones.[329] A state corporation, the Flota Cubana de Pesca (FCP) was established.[330] FCP administered commercial fishing vessels in distant-waters.[331] Many of the first commercial vessels delivered to FCP were longliners. The longliners were ordered in Japan and Spain. A 3-year contract was negotiated with the Japanese to provide skilled personnel to operate the new longliners. The Cubans came to rely heavily on the Japanese to train their longline fishermen.[332] One report indicates that in 1963 when the Cubans purchased five longliners, they requested and received 80 Japanese technicians with the vessels. Reports indicated that preliminary results achieved in 1962 were very low, about 300 t per boat (appendix A9), much less than anticipated. This was attributed to a lack of experience.[333] Cuban longliners were being operated with mixed crews of up to 50 percent Japanese. This was necessary because so few Cubans had longline experience.[334]

1963: Cuba imported five used longliners (*Albacora*, *Aguají, Aguja, Delfín,* and *Dorado*) from Japan in 1963. The 41-47 m vessels were equipped with 444 cubic m holds (appendix A3a).[335] The Soviet Union supported the developing Cuban tuna fishery with stock assessment work in the western Atlantic including areas of the Gulf of Mexico, Caribbean, and the northeastern coast of South America. The focus of the test fishing and research was tuna (especially yellowfin), but billfish bycatches were reported. Swordfish was not mentioned in the research report.[336]

1964: Cuba also imported three Castero-class tuna vessels from Spain (*Castero, Marlina*, and *Atún*). These 55-m vessels had 330 t-holds (appendix A4a).[337] The Soviets, following up on commitments made at the Cuban-Soviet Mixed Commission, conducted test fishing and research on tuna in the Gulf of Mexico and wider Caribbean during 1964-65, including areas off Puerto Rico and the Virgin Islands. Again the focus was yellowfin tuna and swordfish was not mentioned in the research report.[338] Cuban officials by 1964 had conceived of a massive expansion of the small Cuban longline fleet. The first major step was to build 20 large, modern longliners in Spain during 1965-67. The next step was an additional order which was eventually planned for 43 longliners. These additional longliners were to be built in 1968-70 (appendix A4b). Press reports indicate that more Spanish longliners were ordered in 1965.[339]

1965: The new Spanish longliners began to arrive in 1965, bringing the fleet up to about 9 longliners (appendix A4c). These longliners were the *Alecrín* class vessels and a total of 20 were eventually ordered, some of which were delivered in 1965.[340] These 50-55 m, 705 GRT Spanish longliners were larger than the longliners purchased earlier (appendix A4a). As a result, they were reportedly much more comfortable for the crews--an important factor for extended distant-water operations. These larger longliners began reaching FAC in 1965, making it possible for Cuban fishermen to significantly expand distant-water operations.[341] The Cubans acquired the purse seiner *Jagua* in Spain 1965 (appendix A4a). The *Jagua* was supposed to be the first of a series of purse seiners and in the 1970s, orders were placed in Peruvian shipyards. The Cubans eventually had to cancel these plans, because of difficulties with Peruvian shipyards and changing market conditions for tuna.[342] By 1965, about 50 of the Japanese technicians had returned to Japan. Cuban authorities were disappointed in the results reported by Cuban fishermen and decided that Japanese technicians continued to be required.[343] The Cubans reportedly recruited 80 more Japanese technicians.[344] The focus of the Cuban fishery was initially planned for tuna. Cuban fleet officials anticipated taking very little shark, only about 5 percent (appendix A10a).

1966: More of the Spanish longliners were received in 1966-67, similar to the ones previously imported, but somewhat larger.[345] A FAO report published in 1967 indicated that the Cuban longliners were not covering production costs because of disappointing yields (appendix A9).[346] The Cubans were still planning, however, to build 43 additional longliners (appendix A4b). Cuban longliners are believed to have experienced much higher shark catches than anticipated.[347] The production plan foresaw shark bycatches of only 5 percent (appendix A10a). This high shark bycatch was a factor in the disappointing earnings of Cuba's tuna fleet (appendix A10b).

1967: The Cuban fleet reached its peak level of 26 large commercial longliners in 1967 (appendix A4c). By 1967, most of the longline catch (nearly 80 percent) was being taken by the Spanish-built longliners.[348]

1968: Cuba had planned to build 43 additional large commercial longliners in Spain (appendix A4b). Construction was due to begin in 1968. These plans, however, were canceled because of disappointing yields with existing longliners.

Photo 15.--The "Albacora" was one of the Delfin-class longliners imported as used vessels from Japan in the early 1960s.

1969: By the late 1960s, most vessels were operating with all Cuban, expect for Japanese fishing masters who continued to work on many longliners into the 1970s.

1970s: FCP/FAC operated with 23-25 large commercial longliners throughout the 1970s. FCP had by the early 1970s substantially reduced the number of foreign crew members. Foreign technicians, mostly Japanese and Spanish, still worked on Cuban longliners. One source estimates that only about 6 percent of the crew members were foreign nationals in the early 1970s.[349] Many longliners, however, still had Japanese masters. The Cuban Higher School of Fishing began to supply crew members with basic technical training.[350]

1970: The commercial Cuban longline fleet in 1970 was still administered by FCP and consisted of about 25 commercial longliners (appendix A4c).

1971: No new tuna vessels were added to the fleet in 1971.[351] All of Cuba's commercial longliners were acquired in the 1960s. No additional orders for additional or replacement longliners were ever placed confirming the limited available information that Cuban longline operations were not profitable.

1972: The Cubans placed an order in Peru for 12 tuna purse seiners from the Pisca shipyard. The order was subsequently increased to 16 seiners.[352]

1973: No new vessels were added to the fleet in 1973.[353] FCP until 1973 was divided into a separate tuna and groundfish trawl fleet. MIP in 1973 decided to formally constitute the Flota Atunera Cubana (FAC) as a separate organization.[354] The Cuban tuna fishery had been initiated 10 years earlier in 1963 as part of FCP. FCP continued with the larger trawl operations.

1974: The FAC set a goal of 7,000 t in 1974, a goal which it was able to meet with its longliners and one purseseiner. The fleet was preparing for a major expansion of the fleet and extending operations into the Indian Ocean and Pacific Oceans. The Cubans hoped to increase production to 30,000 t, but this goal was never met (appendix C1a2a). Part of the expanded catch was to come from 16 purse seiners ordered in Peru.[355] The first of the Peruvian seiners was scheduled to be delivered in June 1974, but by the end of the year they were no where near completion.[356]

1975: No new vessels were added to the fleet in 1975. Continued delays and cost over runs were reported at the Peruvian Pisca Shipyard building 16 tuna seiners for Peru. The FAC catch off West African declined to only 7,000 t (appendix C1a2a).

1976: The Pisca Shipyard at Chimbote, Peru, launched the tuna seiners *Jaruco* and *Myabeque*, built under orders for CUBAPESCA. Each seiner eventually cost $4 million and had 600-ton holds.[357] The initial cost estimates were lower, but because of cost overruns the price grew to levels well above prices for comparable vessels from other yards. The Pisca Shipyard asked for further cost increases in early 1976, but the Cubans refused showing increasing impatience with the yards performance. The 16 seiner order was finally canceled by the Cubans before receiving even the first three seiners. As of September 1976 only one of the seiners were completed and two were undergoing sea trials. The delays and the cost over runs caused the Cubans to cancel the order.[358] In the final analysis this may have been beneficial to Cuba. Mexico and the United States declared 200-mile EEZs in 1976 followed by several other Pacific countries. If Cuba had continued to honor the contract, they would have invested $65 million in the vessels alone, not even considering training costs, support vessels, as well as operating and

maintenance costs. The overall investment of scarce foreign currency would have been substantial in Cuban terms and they would have had great difficulty obtaining access to productive Pacific fishing grounds. The Cubans in 1976 announced plans to more fully mechanize existing longline fishing operations.[359]

1978: Cuban officials were studying the purchase of a reported 20 tuna seiners since canceling their order from the Peruvian Pisca Shipyard in 1976. The Cubans continued to show interest in a Pacific tuna fishery. Their plans involved deploying the vessels in Pacific waters and exporting to Pacific countries, including Japan. Discussions were even held with some optimistic U.S. tuna companies about future tuna purchases, if and when the trade embargo was to be lifted. CARIBEX officials reported that Cuban officials had concluded that longlining operations were not profitable. The Cubans reportedly decided to shift the focus of their tuna fishery to purseseine operations in the Pacific. A new cannery was to be built in Havana to handle the increased tuna catch. Completion was scheduled for 1980.[360] Officials also expressed a desire to modernize the coastal skipjack fishery which in 1978 was conducted with 18-m steel baitboats. Officials indicated, however, that purseseiners were not appropriate off Cuba because the water is so clear. They were considering other seiners and a small ferro-cement vessel was being designed.[361]

1979: Press reports indicated that the FAC operated 19 longliners and 1 seiner during 1979. The FAC vessels were awarded high marks in MIP competitions between fleets.[362]

1980s: FAC began the 1980s with 22 large commercial longliners, but by the end of the decade the fleet had fallen to only 10 longliners (appendix A4c). The aging vessels which had never proven profitable even when new were becoming increasingly expensive to operate and maintain.

1980: FAC catches totaled only about 9,000 t--less than half the level reported in 1970 (appendix C1a2a). Cuban officials by 1980 were beginning to assess the possibility of expanding tuna operations in Cuban waters, especially skipjack fishing possibly with small seiners. Existing fisheries targeting skipjack were conducted by baitboats. Cuban officials in conversations with U.S. participants at a FAO meeting expressed an interest in U.S. tuna research.[363]

1981: Cuba reported a 1981 tuna fleet of 21 longliners, mostly large vessels (501-1,000 GRT class). The tuna fleet also included one purseseiner (600 GRT). In addition, about 65 live-bait boats (50-150 GRT) targeted skipjack and blackfin tunas in coastal waters. Two large French shrimp freezer trawlers were converted to longliners for experimental fishing for tuna and tuna-like species.[364]

1982: Fisheries Minister Jorge Fernandez Cuervo in an interview acknowledged that Cuba's longliners were not as productive as had been hoped. Efforts to build pursesiners in Peru had proven unsuccessful. At any rate Cuba had already made a substantial investment in longliners and were in effect stuck with them. He indicated that the longliners had one advantage in that they could be operated in international waters.[365] FAC decided to deploy some small longliners in Cuban waters and the first two were deployed in 1992, reportedly with favorable results.[366]

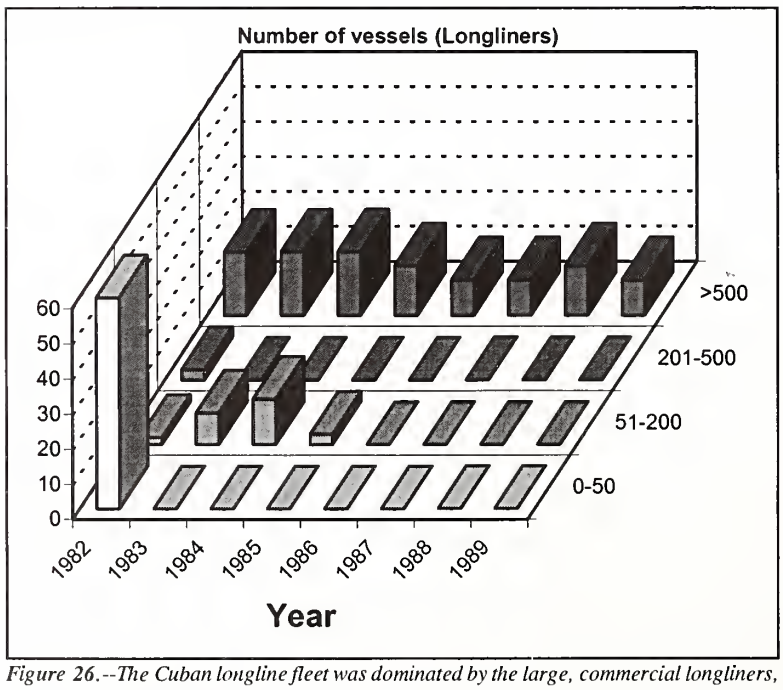

Figure 26.--The Cuban longline fleet was dominated by the large, commercial longliners, but there were also artisanal longliners which Cuba only reported to ICCAT in 1982.

1983: The FAC commercial longline fleet declined to operate 18 vessels (appendix A4c). Cuban fleet reports to ICCAT omitted the large number of about 60 small longliners that they had been reporting (appendix A1). This suggests that the coastal fleet of artisanal longliners was being sharply reduced. Cuba also reported 9 medium-sized longliners (under 200 GRT) during this period. These vessels were about 30 m long.[367] Significant operation were only reported, however, in 1983 and 1984 when 9-13 of these vessels were noted by ICCAT (appendix A1).

1984: The Cuban fleet was little changed from the fleet operating in 1983 and consisted of 18 large longliners (501-1,000 GRT) and 13 medium size longliners (51-200 GRT). The medium-sized longliners were converted shrimp trawlers. Cuban sources report that their catches were similar in scale to the larger

Anchoa-class longliners.[368]

1985: The FAC fleet declined significantly in 1985. The FAC fleet of commercial longliners declined to only 14 vessels (appendix A4c). Some of the larger longliners discontinued operations due to mechanical difficulties. Actual results off West Africa totaled nearly 13,000 t, somewhat higher than in 1980 (appendix C1a2a). Cuban officials reported that most of the FAC fleet of large longliners operating in the central eastern Atlantic was in 1985 more than 20 years old and as a result very difficult to maintain. Officials planned to gradually withdraw the vessels from the fishery, but had no plans to replace them. As a result, officials planned to increasingly rely on vessels deployed in coastal Cuban waters and adjacent areas of the Caribbean.[369] Interestingly, Cuba also reduced its fleet of small and medium longliners which ad for a few years operated along the coast (appendix A1).

1986: Cuba reported no small coastal longliners in 1986. Only a few years earlier there were about 65 coastal longliners (appendix A1). The FAC fleet of commercial longliners declined to only 10 vessels (appendix A4c).

1987-89: The authors have no details on specific fleet developments during this period. No new vessels were added to the FAC fleet. The Soviets began to curtail oil shipments. ICCAT reports that the commercial longline fleet fluctuated from 10-14 vessels during this period (appendix A1). FAC catches off West Africa dropped to only 3,000 t in 1989 (appendix C1a2a).

1990s: FAC continued to withdraw longliners from the fleet.[370] Not only were the aging longliners expensive to maintain, but the breakup of the Soviet Union in 1992 resulted in the termination of the Soviet fuel subsidy. Without the subsidy, Cuba had to retire many FAC and other distant-water vessels. The FAC fleet was reduced to only about 3 longliners in 1994 (appendix A4c). Cuban officials report that by the end of the decade, the longline fleet was completely retired.[371]

1992: One source reported in 1992 that the FAC was discontinuing operations.[372] This appears, however, to have been more of a continued decline in FAC operations as longline operations seem to have continued at a low level for a few more years. The FAC was unable to generate sufficient income to cover fuel and other costs. Details on the disposition of the vessels is unavailable.

1995: MIP reported that the FAC consisted of 15 vessels in 1995, 10 longliners, 1 seiner, and 3 support vessels (appendix A3b).

1996: Cuba sources report that FAC was closed in 1996, although a small staff appears to have been retained. Officials apparently decided that it was simply not cost effective to continue extensive maintenance on their aging fleet. Purchasing new vessels, given the state of the Cuban economy, was out of the question. The authors do not have details on the disposition of the FAC vessels. The longliners were too large to deploy in Cuban waters. The vessels were apparently tied up idle in Cuban ports. Some of the vessels may have been used for other purposes, but most were sold to foreign buyers.[373] Details on the deposition of the vessels is unavailable to the author. Some may have been scraped. Scattered reports suggest that a few vessels may have continued to operate.

1997: For the first time since the early 1960s, Cuba did not report catches off West Africa (appendix C1a2a). This confirms reports that FAC had ceased operations.

1998: Cuban officials continue to be interested in deploying a tuna fishery. Officials since the 1970s had hoped to launch a purseseine fishery. Cuban officials reportedly discussed the possible construction of seiners in China, although financing was lacking.[374] Bermuda sources report chartering the longliner *Jurel* in 1998-99, confirming that not all of the FAC longliners had been sold.[375]

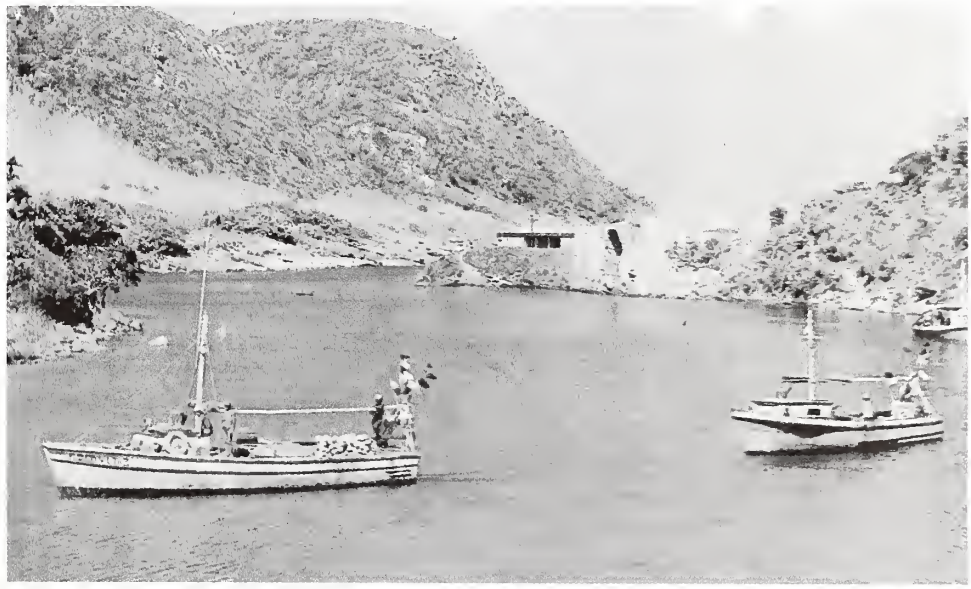

Photo 16.--Cuban artisanal fishermen deploy a wide variety of small boats for the longline fishery off the northwest coast. These are some of the smallest boats.

1999: Press reports suggested that Cuba had purchased some new trawlers and planned to recondition others in Spanish shipyards.[376] The authors have noted no indication, however, that the Cubans plan to replace the retired longline vessels with a new fleet.
2000: Small locally built Cuban longliners (no larger than 20 m) continue to be seen in artisanal operations along the northern coast.[377] The authors, however, have no details on the status of this fishery and operations appear quite limited.

C. Vessel characteristics

Both artisanal and commercial vessels are deployed in Cuba's pelagic fishery for tuna, swordfish, billfish, and shark. Since the 1960s, almost all of the Cuban swordfish catch has been taken with longliners. The Cubans, however also deploy baitboats and one commercial purseseiner for tuna and related species. Identifying the type of vessel is not always easy from Cuban media and industry reports. Often Cuban journalists and officials refer to the vessels as, for example, the M/P *Aguja*. M/P means "motopesquero".[378] As best the authors can determine M/P is the standard MIP designation for fishing vessel, much as F/V is used to indicate a fishing vessel in the United States. This is not a very helpful designation as virtually all the MIP fleet is now motorized. Perhaps it is a continuing custom from when many Cuban vessels still used sails. When it is used, however, the type of vessel can not be determined, other than it is a fishing vessel and not, for example, one of FCP's refrigerated fish cargo or carrier vessels.

1. Longliners (palangreros)

a. Artisanal vessels

The artisanal swordfish fishery conducted off northwestern Cuba has been conducted by a great variety of small boats. Some of the boats were quite small, with lengths as little as 8 m, but boats up to about 22 m have been used in the fishery. They have mostly been constructed domestically with both wood and ferro-cement hulls. A 1960s report indicated that boats up to 9.0-10.5 m were being used in the fishery, but that the average was 7.5-9.5 meters. All of the artisanal craft in the early phase of the fishery were open boats without cabins.[379] These small boats limited operations to day trips. Cuban researchers recommended that larger boats with ice holds be deployed in the fishery to permit longer trips of 4-5 days.[380] Three different types of small wooden hull craft were employed in the fishery during the 1980s in addition to the larger Ferro-cement VI and Sondero classes. Fishermen deploy their small boats close to the coast. The smaller boats have autonomies of only 1 day while the larger boats are capable of 8-9 day trips (appendix A2).[381] The authors have no current information as to what vessels are currently active in this fishery. The authors have received differing

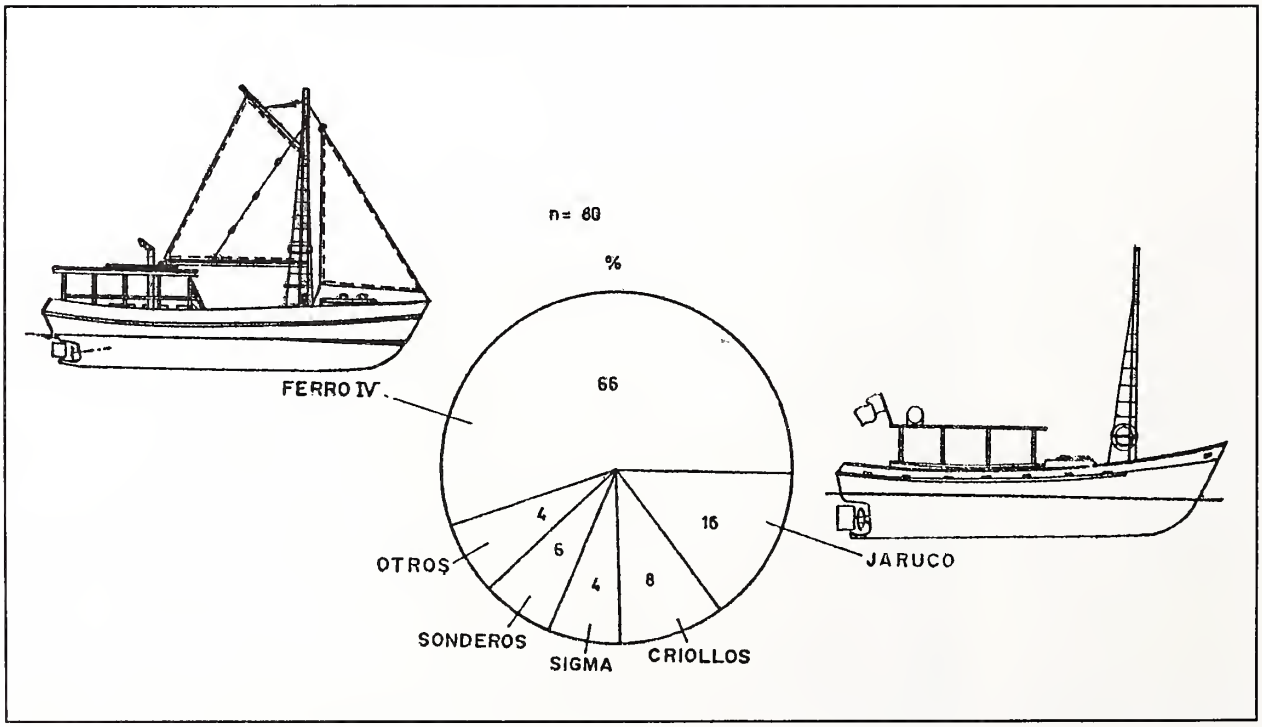

Figure 27.--Several different classes of domestically built boats were deployed in the artisanal longline fishery, the most important was the Ferro IV. Rodríguez

reports as to the current status of this fishery. As best we can determine it continues, but at reduced levels.[382] One important development concerning the construction of small boats in general as been during the 1990s a shift to fiber-glass (GRP) construction.

b. Commercial

The Cubans authorized some trial Japanese longlining beginning in 1957. The Revolutionary Government launched Cuba's own longline fishery in 1962 with Japanese vessels. Vessels ranging from 250-600 GRT were deployed in the Gulf of Mexico, Caribbean, and Atlantic. The Cubans relied heavily on Japanese specialists during this period and in many cases used Japanese masters to captain the longliners.[383] The longliners were equipped with Japanese fishing gear of 280-330 baskets (5 hook). They targeted yellowfin tuna (in the Gulf of Mexico), tunas and marlins (in the Caribbean and Atlantic) and bluefin tuna (east of Florida). Eventually the Cuban longline fleet shifted to the eastern central Atlantic off West Africa. By 1967 the Cuban fleet was averaging trips of 85-90 days achieving 62-66 days fishing and catches of about 115 t per trip.[384]

Almost all of the Cuban longliners consist of three vessel classes built in Japanese and Spanish shipyards. All of the vessels in these three classes are not exactly identical. In the process of construction, some changes were made over time in the building of individual boats. The characteristics however are quite similar. The name of each vessel class corresponds to the name of the first vessel constructed in that class.

Anchoa: The Anchoa longliners were the bulk of the FAC fleet. Cuba ordered 20 of these longliners in Vigo, Spain shipyards. Most of the vessels were delivered in rapid secession during 1965-66. They were nearly 50-55 m long and 705 GRT. They had 1,300 hp engines capable of 12.5 knots (appendix A4a). The vessels appear to have been named after species of fish native to Cuba (appendix A5b).

Castero: The Castero longliners were built in Spain. There were three of these vessels (*Castero, Marlina,* and *Atún*). The *Castero* was built in 1963 and the other two about the same time. These 55-m vessels had 330 t-holds (appendix 4).[385] They had 1,320 hp engines capable of 13 knots.

Delfín: The Delfín class was 41-47 meters long and had a GRT of 387 GRT. Five vessels (*Albacora, Aguají, Aguja, Delfín,* and *Dorado*) were constructed in Seiki, Japan during 1962-63. The engines had 700 horsepower and the vessels were capable of 11.5 knots. The freezing line could produce 8-10 t of fish per day (appendix A3a).

Shrimp trawlers: Cuba in the 1980s converted some shrimp trawlers for longline operations. At least some of these appear to have been relatively large shrimp distant-water trawlers that had been built in France during the early 1970s. The refitting was done at the Mariel and Chullima shipyards during the early 1980s.[386]

One notable aspect of the development of the Cuban longline fleet was that virtually all of the large commercial vessels constructed in the mid-1960s. A few longliners were obtained earlier, but the bulk of the feet was the 20 Anchoa-class longliners built in Spanish shipyards (appendix A4a). While the vessels were constructed in reputable shipyards, they were ordered by FCP which at the time had little no experience with distant-water fisheries in general or longlining in particular. As the vessels were ordered before FCP had developed much

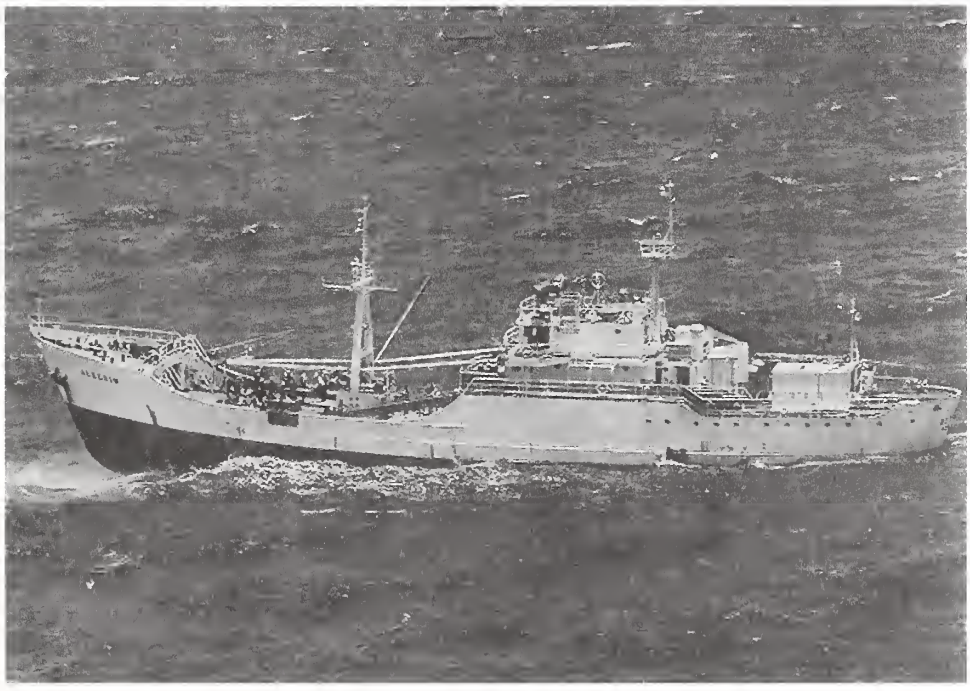

Photo 17.--The "Alecrín" is one of the large Anchoa-class longliners built in Spain during 1965-67. These vessels constituted the bulk of the FAC fleet.

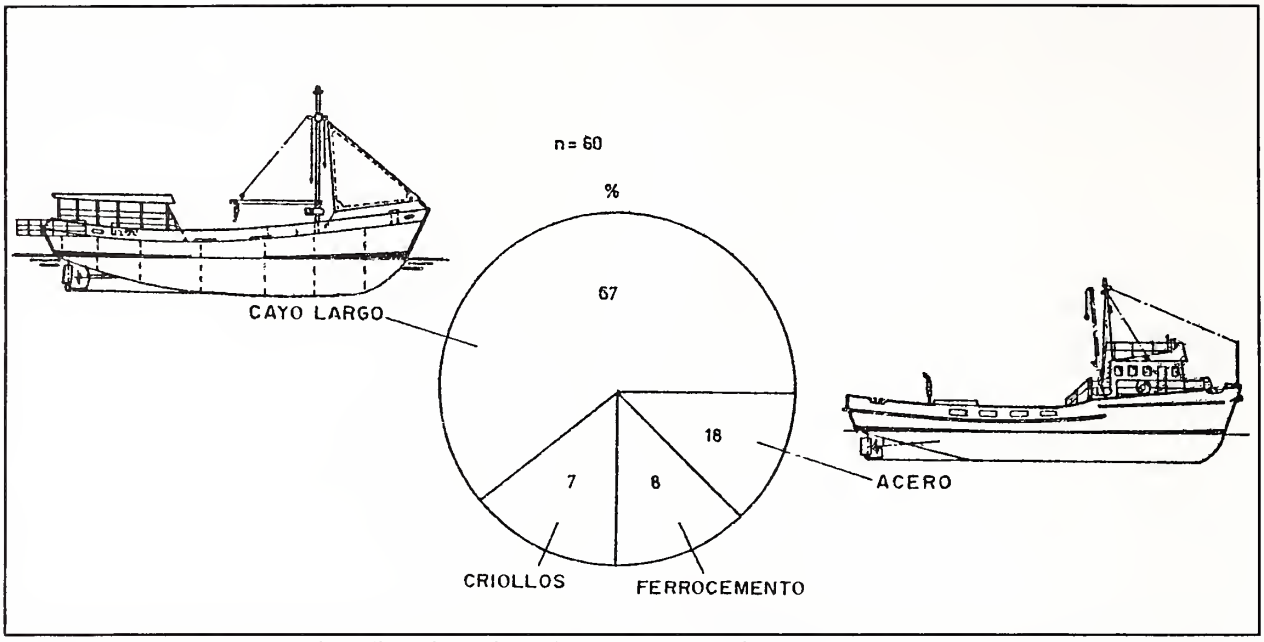

Figure 28.--The primary boat used in the live-bait or baitboat fishery was the domestically built Cayo Largo class of wood hull boats. Rodríguez IV. Rodríguez

experience, it is likely that FCP accepted the designs and characteristics offered without making changes reflecting Cuba's unique situation. We do not know to what extent the design or the fishing strategies and methods developed for the fishery were incorporated into the design of the vessels. Notably, after the Anchoa class vessels were delivered in the 1960s, Cuba made no more significant longline purchases. There was no effort to gradually replace the aging fleet, even in the 1980s. Cuban officials refer to the cost of operations and limited productivity.[387] The authors know, however, of no published accounts by FAC studying the productivity of the distant-water fishery.

An important characteristic of fishing vessels is fuel efficiency. Often fuel consumption is the single greatest expense in fishing operations. This is particularly important consideration for a country like Cuba which has to import most of its fuel. Cuban officials in the 1970s reported that their commercial longliners used about 3.5 t of fuel daily when moving to and from fishing grounds, but only 2.2-2.3 t of fuel daily while involved in actual fishing operations.[388] Cuban officials even when the Soviets were providing a massive fuel subsidy were concerned about fuel consumption. FAC Director Ferrar claimed that the tuna vessels he was managing by 1972 had reduced fuel consumption to an average 2.2-2.3 t from 3 t per day.[389] The authors have no more recent estimates on fuel consumption. By the 1990s, because FAC was still using some of the vessels built in the 1960s, it is probable that already high fuel consumption levels were increasing. Fuel consumption can be quite high for older vessels.

2. Baitboats

Cuba launched a live-bait fishery for tuna in 1932. The fish was used to supply domestic canneries. The fishermen in the 1950s deployed about 40 launches from 9-17 m for skipjack--"bonito" (*Katsuwonus pelamis*) and blackfin--"albacora" (*Thunnus atlanticus*). As skipjack is often referred to as "bonito", the live-bait or baitboats are referred to by the Cubans as "boniteros"--bonito boats.[390] Atlantic black skipjack (*Euthynnus alletteratus*) is also taken. The boats had small motors, but also a sail for auxiliary power.[391] The vessels were limited to operations within about 15 km of the coast.[392] A variety of boats were used in this fishery. A typical boat in the early years of the fishery was a modified sloop with a gaff-rigged mainsail, usually with a flying jib. Sizes ranged from about 9-18 meters.[393] Many of these traditional boats were retired in the 1960s and 70s. Cuban shipyards built many new boats for this fishery, commonly ferro-cement boats. One observer indicates a shrimp trawler was converted as an experiment.[394]

Few details are currently available on Cuba's baitboat fishery. Cuba stopped providing fleet data on this fishery to ICCAT after 1989. Reports from Cuba in the early 1990s confirm that the fishery was continuing and that the principal species taken was skipjack.[395] The 50-60 "ice well" boats reported to ICCAT during the 1980s were the Cuban baitboats. Many were the Cayo Largo class of boat.[396] Cayo

Largo boats were built in Cuban yards beginning about 1966. They were wood hull boats about 19 m long with a very shallow draft, only about 1.5 meters. While motorized they were also equipped with sails, although that was more for the lobster fishery. The narrow draft made them perfect for the lobster fishermen who often worked in shallow waters, but they were also used as bait boats.[397] Reports from Cuba indicate that the live bait vessels were still operating as of the early 1990s.[398] The continued catch of species such as blackfin tuna, Atlantic black skipjack, and skipjack in waters off Cuba are a further indication that this fishery continues to operate (appendices C6a and C7b). Sharply lower catches, however, were noted in 1999.

Photo 18.--Cuban fishermen conduct a live-bait fishery for skipjack and other tunas with a variety of boats. The fleet totaled 50-60 boats in the 1980s, but current information is unavailable.

3. Purse seiner

Cuba has deployed only one purse seiner, the *Jagua*, in its tuna fishery. Plans were initially for *Jagua* to serve as a training ship which could help prepare crews for a planned fleet of purse seiners. The 586 ton *Jagua* was built during 1970 in Japan (appendix A4a). It has been primarily deployed in the eastern Atlantic off western Africa. It mostly targets yellowfin and skipjack. The last year the Cubans provided data (1989), it caught about 200 tons. It previously (1987) caught about 600 t of tuna.[399] The vessel was used as a training as well as a fishing vessel.[400] FAC withdrew from the eastern central Atlantic in 1996. The authors do not know what has happened to the vessel, but considering its age it may have been scrapped.

Photo 19.--Cuba has deployed its one purse seiner, the "Jagua" in the eastern Atlantic because the clear water off Cuba makes purseseining ineffective.

Cuban officials were interested in deploying a tuna purseseine fleet. The Cubans ordered a fleet of purseseiners from Peru in the 1970s, but the Peruvian yards did not deliver as contracted and the Cubans eventually canceled the order. Cuba has not since committed the necessary funds, but officials continue to be interested in acquiring purseseiners. As recently as 1998 the subject of purseseiners was raised in conversations with Chinese officials. The Cubans were interested in ordering purseseiners from Chinese shipyards, but lacked financing.[401]

D. Individual vessels

Some limited information is available on individual Cuban longliners. The Cuban press reported regularly on the operations of their longliners during in the 1970s and early 80s. As operations declined after the mid-1980s, however, these reports became less frequent and little information is available on the current status of the vessels. The authors believe that this basically reflects reductions in fleet operations as the Soviets cut back deliveries of subsidized fuel. Many of the FAC longliners were idled in the early 1990s. After the FAC was closed in 1996, most of the remaining vessels were idled. One report indicated that they have mostly been sold. Many may have been scrapped, but few details are available on the eventual disposition of these vessels.

The authors have noted several individual vessels mentioned in various press accounts, primarily the Cuban press. While some of these press accounts are a reflection of the press in a communist country which publishes often mundane economic statistics for news, they do offer some insights into fleet operations and management style.

Aguja: The *Aguja* was one of the Delfín-class longliners built in Japan during 1962-63 for FCP. It helped initiate Cuba's distant-water fishery in the early 1960s.[402] The Aguja reported a 1973 catch of 307 tons.[403] While Cuban media heralded such results as impressive, they were far below initial plans and the results reported by other distant-water fishing countries (appendix A9).

Aguaji: The *Aguaji* was another Delfín class, Japanese-built longliner acquired by FCP. It was delivered in 1963.[404]

Albacora: The *Albacora* was another Delfín-class longliner acquired by FCP. It was delivered in 1962.[405] It was the most productive Japanese-built longliner in 1973 with a catch of 324 tons.[406] Again this was far below what Cuban fleet planners had expected (appendix A9).11

Alecrín: The *Alecrín* is one of 20 Spanish-built Anchoa class longliners that the FAC began incorporating in to the fleet during 1965.[407] The *Alecrín* became one of the most celebrated of Cuba's longliners. In the mid-1980s, it was the flag-ship ("buque insignia") of the FAC. The vessel was fired on and seized by the Venezuelan Navy on November 20 1968, about 160 km north of Venezuela. The Cubans claim that they were in international waters when intercepted by the Venezuelans. As a result of the Venezuelan fire, the vessel almost sunk.[408] The *Alecrín* was held in the Venezuelan port of Carúpano for several months. One crew member was Japanese, showing that the FAC was still using Japanese fishing masters on many of their longliners. The vessel was almost lost again in 1986. Crew negligence allowed water to enter the hold and the vessel almost sunk. Even so, the vessel and the machinery aboard was extensively damaged. The FAC decided to repair it and the *Alecrín* was returned to service in 1987.[409]

Anchoa: The *Anchoa* was the first of the large order of 20 longliners delivered by Spain in the mid-1960s. The *Anchoa* was deployed in the central Atlantic and north Atlantic during 1978 and reported some of the highest catches in the FAC, particularly of yellowfin, swordfish, and albacore.[410] The *Anchoa* received awards during 1979 for high catch rates.[411] The reference to this and other awards show how extensively non-monetary incentives were used by FAC and other production units in Cuba.

Arenque: This Spanish-built Anchoa-class longliner was one of the most productive in 1973 with a catch of 388 t of fish.[412] It was still active and reporting superior performances in 1980, for example, exceeding the 104 t plan by 155 percent.[413] The vessel appears to have been withdrawn from the fleet before 1993 (appendix A5b).

Arigua: This Spanish-built Anchoa-class longliner was the most productive in 1973 with a catch of 425 t of fish.[414] Press reports indicated it was operating in the central Atlantic out of Las Palmas during 1977.[415]

Bajonao: The Spanish-built *Bajonao* was one of the Anchoa-class longliners built in Spain during 1966.

Bonito: This 55 m steel hulled vessel was built in Spain during the mid-1960s. It is known to have been active in the Cuban distant-water fleet in 1970. It had a 343-t freezer hold and carried a crew of 39. It was one of the vessels used in the FAO fisheries development project to improve the Cuban longline fleet (appendix A5c).[416]

Castero: The *Castero* was the first of three longliners built in Spain for FCP. The vessel was deployed in 1964 or 1965.[417]

Cubera: The *Cubera* was one of the Spanish-built Anchoa-class longliners. It scored high on the FAC's competitive fleet scheme ("Emulación Pesquera") in 1977.

Damero: This Spanish-built Anchoa-class longliner

was one of the most productive in 1973 with a catch of 405 t of fish.[418] This was one of the highest catches reported by a Cuban longliner. Although it was still short of expected production (appendix A9), it well above what most other Cuban longliners were reporting. *Damero* again ranked high in 1978, the second best FAC longliner with a catch exceeding its plan quota by 35 percent.[419]

Photo 20.–The "Castero" longliner class was built during the early 1960s. Many Cuban fishermen got their first experience with Spanish longlining aboard the "Castero" and its sister ships.

Delfín: The *Delfín* was the first of five commercial longliners acquired by FCP. It was one of the Japanese vessels which helped initiate Cuba's distant-water fishery in 1962.[420]

Dorado: The *Dorado* was one of the Delfín-class longliners acquired by FCP from Japanese shipyards in 1962-63.[421] It reported a 1973 catch of 316 tons.[422]

Emperador: The authors have few details on this Spanish-built longliner. It reported a catch of 397 t of fish in 1973.[423] This was also one of the highest catches reported by a Cuban longliner. Although it was still short of expected production (appendix A9), it well above what most other Cuban longliners generally report.

Gilberto Pico: This tanker was supplying the FAC longliners operating in the eastern Atlantic during the late 1970s and early 1980s.[424] It was one of the two FAC tankers attacked by fighter aircraft off the Western Sahara in 1980. The Cubans were diplomatically supporting the Polisario resistance group fighting for Western Sahara's independence and the Moroccans concluded that Cuban vessels were supplying Polisario. The two Cuban tankers were 25-30 km off the Western Sahara at the time of the attack.[425] The authors are unsure as to why the two tankers were in this area. It would appear to have been very close to the coast and somewhat to the north of where the Cuban fleet normally operates. It is possible that the tankers took on fuel in the at a port north of the fishing area and were moving toward the Cuban fleet.[426] It is also unclear why two tankers were in the same place at the same time.

(Las) Guasimas: This Cuban fisheries support tanker was used to supply fuel to Cuban distant-water fishing vessels.

Jaruco: The Pisca Shipyard at Chimbote, Peru, launched the tuna seiner *Jaruco* on April 24, 1976. The vessel was built under orders for CUBAPESCA which ordered a total of 16 seiners from Peruvian yards. Each seiner cost $4 million and had 600-ton holds. The vessel had a speed of 13.6 knots and carried a crew of 22.[427] The Peruvian shipyard, however, experienced a variety of production delays and cost over-runs. Details are sketchy, but the Cubans canceled the contract in September 1976 and was thus never delivered.

Jotura: The *Jotura* was one of the 55 m Anchoa-class longliners. It was built in Spain during 1965.

Jugla: One of a fleet of Soviet tankers used to supply the country's distant-water fishing fleet. Cuba had some tankers, but they apparently were not always available to supply Cuba's distant-water fleet. The *Jugla* and other Soviet tankers, as a result, often supplied Cuban tuna vessels under contracts between the FAC and the Soviet fishing fleet.[428]

Jurel: This aging Anchoa-class longliner in 1998 was leased to a Bermuda businessman, along with its crew, for operations off Bermuda. It was granted a provisional fishing license in 1998.[429] Inspections, corrective measures, and crew documentation delayed operation.[430] The first landings were not reported until January 1999.[431] Unlike other foreign vessels operating under licenses, this vessel because it was leased by a Bermuda resident, was allowed to land, its catch in Bermuda for sale on the local market. The Bermuda businessman was impressed with the Cuba crew and fishing operation, but complained that the vessel was a real "rust bucket". Problems were encountered with Bermuda work permits as well as the cost of repairing and maintaining the Jurel. In addition, the captain kept landing large quantities of

shark which could not be sold in the local market.[432] The Bermuda company reported difficulty communicating with the captain and explained that they could not use the shark he was landing. These problems caused the Bermudian businessman to let the lease expire in June 2000. As a result of these problems, only 9 months of actual fishing operations were possible.[433]

Liseta: The Cuban press in 1976 cited this Anchoa-class longliner as one of the most outstanding in the Cuban fleet, exceeding its plan by 112 percent with almost all crew members fulfilling their plan.[434]

Magro: This 23-m wood hulled vessel was a Lamda-75 class boat built in Cuba during the 1960s. It had a 30-t ice hold and carried a crew of 14. It is known to have been active in the Cuban coastal fleet during 1970. It was one of the vessels used in the FAO fisheries development project to improve the Cuban longline fleet (appendix A5c).[435]

Machuelo: This Anchoa-class longliner was known to have been active during the 1970s, operating out of Las Palmas.[436]

Marlina: This was one of the three Castero-class longliners acquired in Spain during 1963.

Medregal: The Cuban press in 1976 cited this Anchoa-class longliner as one of the most outstanding in the Cuban fleet, exceeding its plan by 102 percent with all its crew members fulfilling their plan.[437]

Merluza: The Spanish-built *Merluza* was one of the Anchoa-class longliners built in Spain during 1966. The *Merluza* was used in 1980 to study alternative compensation schemes. It was still active in 1989, receiving a high performance award.[438]

Mero: The Anchoa-class longliner *Mero* ranked high in 1978, the best FAC longliner with a catch exceeding its plan quota by 29 percent.[439] The Cuban press indicated that the *Mero* in 1989 landed 110 t of swordfish, a record for the Cuban fleet. The vessel achieved 115 sets during the trip. The previous record (97 t) had been reported by another longliner in 1983.[440]

Moroboro: This FAC tanker was the second of two vessels attacked by Moroccan fighter planes off the Western Sahara in 1980. The captain of the vessel was killed in the attack.[441] (See the *Gilberto Pico* above for a fuller discussion of this incident.)

Myabeque: The Pisca Shipyard at Chimbote, Peru, launched the tuna seiner *Myabeque* on April 24, 1976. The vessel was built under orders for Cubapesca which ordered a total of 16 seiners from Peruvian yards. Each seiner cost $4 million and had 600-ton holds. The vessel has a speed of 13.6 knots and caries crew of 22 persons.[442] The Cubans canceled the contract in September 1976 after repeated delays and significant cost over-runs. As a result the vessel was never delivered.

Oceano vessels: Cuba also deployed several large refrigerated transport vessels. The large Oceano Atlantíco class was 9,500-10,550 GRT and were built in Italy. They were used to transport fish from distant-water fishing grounds. They were primarily operated by FCP, but because FAC also handled frozen product, some of the vessels may have been used by FAC. While FAC exported much of the catch in the eastern Atlantic through the Canary Islands, cargo vessels were needed to transport the shark bycatch and other product destined for the Cuban market.

Pargo: This Anchoa-class longliner is known to have been active in 1974, operating out of Las Palmas. The *Pargo* received awards during 1979 for high catch rates.[443] The *Pargo* was still active in 1987 when it also received awards for high production.[444]

Pelamis: This CIP vessel was used for test longlining in Cuban waters during 1980-81.[445] The authors believe it is one of two large French-built vessels converted to tuna baitboats.[446]

Photo 21.--The "Oceano Artico" is one of several Italian-built refrigerated transports used by FLOCUBA. The extent to which FAC uses these transports is unknown. Richard Berry

Rascasio: Press reports indicated this Anchoa-class longliner operated in the central Atlantic during 1987. It was one of the first Cuban longliners to operate in the central Atlantic out of Havana rather than Las Palmas. The shift to Havana was an effort to save hard currency expenses as Cuban pesos were not accepted for payment at las Palmas. Officials reported that hundreds of thousands of dollars have been saved by servicing the vessels in Havana.[447]

Ro-Sesi: This 20-m wood hulled vessel was known to be operating with the Cuban fleet in 1970. It was one of the vessels used in the FAO fisheries development project to improve the Cuban longline fleet (appendix A5c).[448]

Robalo: This FAC longliner received awards during 1979 for high catch rates.[449] It also reported superior results in 1980.[450]

Sama: This 18-m, wood hulled vessel was a Lamda-75 class boat built in Cuba during the 1960s. It is known to have been active in the Cuban coastal fleet during 1970. It had a 18-t ice hold and carried a 12-person crew. It was one of the vessels used in the FAO fisheries development project to improve the Cuban longline fleet (appendix A5c).[451]

Sierra: Press reports indicated this longliner operated in the central Atlantic during 1987. It was another Cuban longliners to operate in the central Atlantic out of Havana rather than Las Palmas.[452] *Sierra* ranked high in 1978, the best FAC longliner with a catch exceeding its plan quota by 39 percent.[453] The FAC also noted *Sierra*'s superior performance in 1980.[454]

Tuma: This is another Cuban tanker used to supply longliners operating off West Africa. Cuban longliners are commonly supplied at sea. The tanker was capable of delivering 100 t of diesel fuel in 4 hours. The *Tuma* was launched in 1974, reportedly the fourth steel vessel launched in Cuba. These tankers would make trips of 3 months, returning to Cuba with letters and packages sent by the fishermen to their families in Cuba.[455] Fuel supplies from Cuban or Soviet tankers were critical because this meant subsidized Soviet oil could be used rather than having to purchase fuel at ports like Las Palmas which would have required hard currency.

Victoria-122: This 37-m steel hulled vessel was built in Japan during the mid-1960s. It is known to have been active in the Cuban distant-water fleet in 1970. It had a 100-t freezer hold and carried a crew of 26. It was one of the vessels used in the FAO fisheries development project to improve the Cuban longline fleet (appendix A5c).[456]

E. Crews

Cuba's commercial longliners carried crews of about 40-50 men. The Japanese-built longliners required a larger crew than the Spanish longliners, presumably because of variations in the gear used (appendix A8). One Cuban fisheries expert reports that constant changes in crews by FCP/FAC affected the efficiency of the vessels.[457]

Cuba developed one of the most extensive fisheries training programs in Latin America. It involves both formal educational facilities for youths as well as programs for professional training. (See " Government policy: Fishermen") Since the collapse of Cuba's distant-water fleets, the need for trained personnel has declined. The authors have no details as to how the various training facilities are adjusting.

Commercial fishermen in some communist countries were fairly well compensated in relative domestic terms. Salaries were well below the compensation of fishermen in market economies, but above salaries in the domestic economy. Distant-water fishermen also had the opportunity to make purchases during stops in foreign ports and resell these items at home. This was an important part of the real earnings of Soviet and Ukrainian fishermen.[458] The same appears to have been true of Cuban distant-water fishermen. They were given small amounts of dollars which they could spend in foreign ports of call and bring back scarce consumer goods to Cuba when they returned home.[459]

The authors have received various conflicting reports about the wages of Cuban fishermen and their job satisfaction:

Poorly paid: At least one source reports that one of the reasons for FCP's and FAC's difficulties, was the fact that the fishermen were not well compensated. One source reports that substantial numbers of FCP crews jumped ship in foreign ports of call.[460] Again the authors have no details as to how common this was. One 1972 report indicates over 100 defections occurred in Spain and the Canary Islands over a 2-3 year period.[461] A CIP researcher who left Cuba himself, however, reports such defections were relatively rare.[462] The FAC's choice of ports certainly affected desertion rates. One source believes that low Cuban salaries encouraged crew members to desert or to transfer jobs. FCP's salary policy for many years was ideologically based and that salary levels were standardized so that everyone received about the same wage.[463] An observer believes that the low salaries paid Cuban fishermen was one reason for the poor

economic performance of FCP and FAC.[464] The FAC, after studies on the fishing vessel *Merluza*, reportedly introduced a piece-payment system in 1980. The new payment scheme provided bonuses for high achievers.[465]

Well paid: Other observers report that Cuban fishermen were well paid. Because of the bonuses available under the old system, fishermen were some of the best paid Cuban workers.[466] Some fishermen earned as much as 1,000 pesos per month. This would be three or times average monthly earnings in Cuba. A fisheries biologist, for example, earns only about 370 pesos monthly.[467] This estimate was for a fisherman employed in the lobster and other coastal fisheries. The authors have no estimates on what FAC fishermen were earning.

Often worker satisfaction is a relative matter as to how his or her salary compares to that of others. The relatively high salaries Cuban fishermen received, in comparison to other workers, would be an important factor--even though the actual value of those earnings may relatively low. One former CIP researcher reports that while Cuban fishermen were very poor before the Revolution, they have become some of the best paid workers in Cuba.[468] Interestingly, while the fishermen are paid low salaries by world standards, Cuban planners in the 1960s calculated salaries and social security at nearly 30 percent of fleet operating costs (appendix A11a).

The Cuban Government, which has limitations on how much it could compensate workers. The Government has also relied heavily on competitions and non-monetary awards to motivate workers. The critical shortage of hard currency in Cuba meant that the Government has limited financial assets for such awards. There was also a strong communist ideological mind set against paying some workers more than others. Thus the Cuban Government used an award system with only limited financial costs. These awards were, however, of some tangible value to the workers. They go on the worker's record and can be influential in deciding on training and promotions or other important decisions like assigned housing, an especially important benefit. The authors believe that award winners in the past received non-monetary, material awards such as access to rationed goods, but this is not publicized extensively and few details are available. Policies on these material rewards have varied over time. Workers achieving distinction during the 1980s, for example, were allowed to buy a variety of home appliances and in some cases even cars.[469]

Various award competitions evolved over time. The Cuban media has stressed competitions for "Al Rojo Vivo" and "Emulación". The authors are unsure as to how to best translate these terms, but the "Red Hot Emulation" awards probably comes close. They designate that the individual or unit has performed outstandingly and is a example to be emulated by others. Awards are given to workers annually on each vessel.[470] Then from the list of vessel award recipients, additional awards are given by MIP for the outstanding workers. The most committed worker each year was named the FAC Vanguardia Nacional. The 1983 award, for example, went to Carlos Kelly León.[471] The FAC led year after year in the Red Hot Fishing Emulation award among competing MIP fleets. This award is presented to both the best vessels in a fleet as well as the best fleets among the various MIP operations. FAC in the 1970s was repeatedly been awarded the best high seas fishing fleet.[472] These awards are interesting in a fleet that was not operating profitably. The FAC was much less commonly named, however, in the 1980s.

Photo 22.--One interesting question concerning the Cuban fleet is whether state-owned vessels can be as well maintained as privately owned vessels. The APPs may also affect maintenance.

The Cuban Government, including MIP is making major reforms in compensation schemes.[473] Many of these reforms have been applied to the Asociaciones Provinciales de Pesca (APPs) operating along the Cuban coast. The salary scheme for fishermen aborad the remaining large distant-water vessels has not yet been fully worked out. In any event these reforms did not affect FAC which ceased significant operations in 1996.

The FAC encouraged Communist Party membership. All the fishing vessels and support ships have party cells and membership in 1981 membership totaled 585.[474] The Cuban Communist Party at its infrequent Party Congresses is composed of delegates from a wide range of Cuban organizations including state enterprises such as units of the MIP--including the FAC.[475] One interesting aspect of the selection of the FAC delegates is that they are not all ranking officials, but rather selected in a "guided" electoral process. Delegates include representatives like Lucas Manuel Gonzalez, a cook's assistant.[476] Also interesting is the number of black Cubans, like Gonzalez, that are chosen. Blacks before the Revolution were heavily discriminated against. It was not a legal form of discrimination as in the American South, but it was real just the same. The inclusions of blacks in such role is notable, even in comparison to other Hispanic countries.

One important benefit offered by MIP and many other state agencies is housing. MIP does provided housing to its staff.[477] MIP has financed the construction of housing for its workers. The Instituto Nacional de Pesca (INP)[478] reports that whole towns and residential communities were built for fishermen and other fishing industry employees (workers in processing plants, ports, and other facilities).[479] The authors are unsure if FAC has any special programs or just participates in the general MIP effort. Some of the houses were built by MIP micro-brigades, nominally voluntary work units. It is unclear to the authors, however, who actually owns these houses. MIP may retain title to the housing provided, rather like company housing in a mine or mill town.

The Cuban Revolution is proud of the extent to which women's rights have been addressed. Many occupations have been opened to women. This does not appear to have been the case for the fishing industry. Few if any women work aboard Cuban fishing boats. The authors have not noted any women among the longline crews pictured in Cuban publications. One observer does report a few women employed on distant-water vessels, including one captain.[480] There are some women aboard the Cuban fisheries cargo vessels such as the Océano Pacífico.[481] Most of the women employed by MIP are employed in processing plants. Some marine biologists--although not as many as might be expected--are women, but for the most part men appear to dominate MIP. This can be noted in the bibliography, there are few Cuban women listed in the sources. Also the awards distributed by FAC were almost always to men.[482] This is not particularly unusual, as fishing is seen as men's works in most other countries. It is interesting to note, however, in a country which prides itself on expanding opportunities for women, that some traditional roles persist.

F. Maintenance

An important factor in assessing the Cuban longline fleet is maintenance. The authors know of no published FCP or FAC assessment of the maintenance program. Some basic assessments, however, are possible. The productive life of a commercial fishing boat can extend about 30 years, perhaps a few more years if well maintained.[483] Fishing vessels up to 40 years old are not unknown, but would have needed substantial overhauls.[484] Many owners do not want to operate vessels for that amount of time. After 15-20 years, however, maintenance costs can escalate as parts have to be replaced. One Cuban source reports that maintenance problems can become significant in about 10 years.[485] At some point vessel maintenance and needed modification exceed the cost of purchasing a new vessel. Another serious problem is fuel consumption increases. The FAC commercial longliners were built in the 1960s, from about 1962-67 (appendix A4a). Operational efficiencies will be affected by maintenance. A great deal of the maintenance of Cuba's large commercial vessels was initially done in foreign shipyards. One Cuban report indicates that until the 1980s, the Río Damuji-class trawlers were maintained abroad, requiring the expenditure of foreign currency.[486] Much of the maintenance for Cuba's longliners also was done in foreign shipyards requiring the expenditure of foreign currency.

The authors have no details on the effectiveness of the Cuban maintenance program. Two factors affecting vessel maintenance generally in Latin America probably are true of Cuba, although such a conclusion requires additional information.

Latin American pattern: Vessel maintenance is often lacking in Latin America. This is in part because spare parts are expensive. This would be a special problem in Cuba with severe limitations on imports. It is also due to the low priority that many Latin American vessel owners often place on maintenance. This is

readily observable if one compares the vessels in many Latin American fishing ports to those in the United States and Europe.[487]

State corporations: Vessels operated by state corporations and cooperatives are usually not as well maintained as those operated by individual owners. The Cuban commercial longliners were all operated by state companies. Cuba for its coastal fishery is putting vessels in the hands of the Asociaciones Provinciales de Pesca (APPs). Each vessel now has to be in essence self-financing as the cost of fuel and repairs are discounted from the value of the catch delivered. While still nominally state owned, the APPs are responsible for maintenance. It is not yet clear just what impact this is having on vessel maintenance.

It is unclear to what extent maintenance standards have affected the profitability of Cuban distant-water operations, both FCP and FAC. It does seem, however, to have been a significant factor. Scattered reports do suggest that FAC was encountering serious maintenance problems.[488] One Cuban source indicates that some Cuban longliners were "at sea for years without calling at a Cuban port".[489] Often boats would only return to Cuba when major overhauls were needed like completely replacing engines or replacing critical pieces of equipment. Cuban press reports begin mentioning maintenance problems in the 1970s. Generally articles explained what a wonderful job the fishermen were doing in addressing the problems (appendix A6b).[490] Readers have to be aware that in a country with a controlled press that you have to be able to read in between the lines to find useful information. Thus an article explaining how a problem is being resolved may reveal that a problem exist, whether it is really being effectively resolved or not is another question. The existence of the problem may never have been previously reported in the media. Another Cuban source mentioned maintenance problems in the early 1980s.[491] A Spanish source in 1989 reported that some Cuban longliners were idled because of there increasing age.[492] Bermuda sources complained about a Cuban longliner operating out of the island in 1998-99, calling it a "rust bucket".[493] A respected Cuban fisheries expert believes that an inadequate maintenance program was an major factor in disastrous results reported by FCP and FAC.[494] Some Cuban observers believe that escalating maintenance costs were a central factor in the decision to cease FAC operations.[495]

V. Shipyards

Cuban boat production in the 1950s was largely the work of craftsmen and most used wood. Cuba in the 1960s expanded existing yards and opened new ones. Because of declining domestic wood supplies and the expense of steel, several of the new Cuban shipyards opened by the Government beginning in the 1970s attempted to use ferro-cement--with various degrees of success. Shipyards in Cuba during the 1990s have given increasing emphasis on fiberglass (GRP). Cuba now has one of the largest networks of shipyards producing fishing vessels in the Caribbean. The Argus state company operates seven shipyards which both build and service fishing vessels. The largest yard is Asticar in Havana which is capable of servicing large distant-water fishing vessels. Cuba's coastal vessels are constructed in these yards. Shipyard production declined as a result of the depression of the early 1990s. Cuba's large distant-water vessels, both trawlers and longliners, were built at foreign shipyards and imported. While Cuban yards did not build these vessels, they did perform some maintenance and repair work. As Cuba's distant-water fleet was idled and sold off in the 1990s, there has been less work at these yards. Retrenchments by the Russian fishing fleet in the 1990s also reduced work at Cuban yards, especially Asticar. As a result, Asticar is attempting to attract foreign business from foreign distant-water fleets active in the Atlantic.

A. Background

MIP after the 1959 Revolution built several shipyards. Cuban fishing vessels before the Revolution, as elsewhere in the Caribbean, were small and mostly constructed by craftsman. These traditional Cuban shipwrights often worked in individual backyards or at beach locations.[496] Castro in 1960 described the problem faced by the fishing industry as simply, "... we do not have boats." This was in part because of the limited production of Cuban yards. The problem was exacerbated in the early 1960s when many boat owners used the best boats to escape the island as Castro began to introduce a police state. Revolutionary officials, in an effort to provide Cuban fishermen the boats needed to expand fisheries production, announced plans to create modern shipyards throughout the island.[497] Cuba by 1969, 10 years after the Revolution, MIP was operating yards at Cárdenas, Chullima, de Gibara, La Coloma, Santiago, Cienfuegos, Nuevitas, Isabela de Sagua, and Manzanillo.

Photo 23.--The Havana fishing port has two floating docks with a lifting capacity of 2,500 and 4,500 tons. The port can service 160 fishing boats annually.

B. Construction

1. Vessel types

Cuban shipyards do not build distant-water fishing vessels, all of which have to be imported. This required the allocation of substantial amounts of scarce foreign exchange reserves. Cuban shipyards have built the 700-750-ton El Cocal class vessels, but these are fish-base ships and not actual fishing vessels. The largest domestically built Cuban fishing vessels are the 110-GRT Lamda-class vessels. Cuba has converted some larger vessels, such as the French shrimp trawlers which were converted to tuna live-bait boats during the early 1980s.[498] Some of the most active Cuban yards in fishery projects have been the Mariel Shipyard Enterprise and the Chullima Enterprise.[499]

The fishing boats built at Cuban shipyards have mostly been shrimp trawlers, lobster trap boats, and other relatively small vessels for coastal fisheries. Typically a Cuban shipyard, like the Coloma yard, could handle 22 boats as large as 13 t or 30 meters.[500] By the 1980s, Cuba had the largest infrastructure for building fishing vessels of all the Caribbean islands.[501] Many ferro-cement boats were produced, but production is now mostly fiberglass. CUBAMAR reports that Cuban yards in 2000 are constructing a variety of boats including grouper boats, dinghies, lobster boats, sondero fishing boats, and shrimp trawlers. These boats vary from 5-21 m in length.[502]

2. Output

The Cuban shipbuilding industry has built a substantial number of vessels. A variety of sources provide details on vessel construction over time:

1960s: Cuban yards during the 1960s built over 700 fishing boats over 10-m in length (appendix A12). All but a few steel-hulled vessels were built with wood.

1970s: Cuban sources indicates that their shipyards, as of 1977, had built 1,600 fishing boats over 10-m long and 7,500 smaller boats.[503] Another Cuba source provides somewhat lower estimates (appendix 12). Hull materials changed radically in the 1970s. Wood construction virtually ceased and 940 boats were built with ferro-cement hulls, although over 160 steel-hulled vessels were also built (appendix A12). Cuba in the 1970s was the world's leading producer of ferro-cement fishing boats.[504] Officials considered ferro-cement construction a way for Cuba to solve the materials problem because of the limited supply of wood and steel.

Early 1990s: Vessel production apparently slowed appreciably during the early 1990s. The Cuban economy reeled under the shock of losing Soviet subsidies as well as the often subsidized trade with the Eastern European countries. Cuban sources reported both management problems and material shortages. Only 100 fishing boats were reportedly constructed during 1990-94

Late 1990s: Cuban sources reported renewed construction activity during the late 1990s as economic conditions improved. More than 500 fishing boats were reportedly built during 1995-99. Much of this construction was fiberglass.[505] Earlier, fiberglass was almost entirely used for small boats (appendix A12). The authors currently note very little mention of

ferro-cement construction, on which Cuban shipyards had once place considerable emphasis.

3. Material

Cuba ship builders as late as the 1950s and early 60s were mostly using wood.[506] Limited availability of wood on Cuba forced shipyards to seek an alternative material if they were to increase vessel production.

The use of ferro-cement in place of steel or wood was promoted by Cuban officials in the 1970s and 80s. They saw it is an attractive alternative for Cuba which has limited domestic production of both wood and steel and lacked the foreign currency needed to import these materials.[507] Varying reports have been received concerning the effectiveness of the ferro-cement vessels. Scattered press reports suggest that production has been interrupted at some shipyards beginning in the late 1980s.[508] Material shortages related to Cuba's growing economic difficulties appears to be one of the principal problems. The authors have noted, however, little mention during the 1990s of ferro-cement boat construction as a way of alleviating the material shortage. While there does not appear to have been any announcement in the press that ferro-cement construction did not yield acceptable results, the fact that such construction has been sharply reduced or ended, suggests that this is what the Cubans concluded. One Cuban observer reports that the ferro-cement boats were less expensive to produce than other vessel types. The primary problem was that they weighed more than other vessels and these were less fuel efficient.[509] Initially this was not a major concern to the Cubans, but this changed when fuel prices increased and the Soviets began cutting back on oil deliveries. Another observer indicates that they are more difficult to patch or make other repairs. Ferro-cement hulls are also virtually impossible to modify.[510]

The authors note that recent reports released by the Cubans give more attention to fiberglass (GRP) ("barcos plásticos") construction. Most of the fishing vessels now being constructed are apparently GRP vessels.[511] One Cuban source reports that while GRP boats are more expensive to build that the savings from lower fuel consumption rates pays off in time.[512] This conforms to the general pattern in the Caribbean for small boat construction. One 1999 report indicated that about 80 GRP boats are constructed annually, both for domestic use and export.[513] Cuban promotional material that once highlighted ferro-cement construction now stresses the new GRP boats.[514]

C. Individual yards

Cuba's shipyard's are managed by the Argus state company. The facilities are capable of handling a wide range of fishing vessels.

Large distant-water vessels: The Soviet-built ASTICAR facility in Havana services large distant-water vessels. Six smaller shipyards service the coastal fleet.[515] ASTICAR at the Havana port has floating drydocks capable of working on vessels up to 4,500 GRT.[516] The Havana facility was designed in part to provide repairs and support services for the Soviet fishing fleet. The Havana facilities thus had to be capable of handling much larger boats than those operated by Cuban fishermen.

Small boats: Small boat construction and maintenance occupy a significant part of the shipbuilding and repair market in Cuba.[517] Ship building and maintenance and repair services are operated by the several state companies which are all part of the Argos state-owned conglomerate. Until MIP was reorganized, they were units of the MIP Unión de Empresa de Astilleros.

Photo 24.--Cuban shipyards make a variety of small and medium-sized boats like this shrimp trawler. An increasing proportion of the boats now being built are fiberglass.

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Photo 25.--Cuba builds its own coastal vessels. CARIBEX promotes export sales for Cuban shipyards. Ferro-cement construction has been largely replaced by fiberglass in recent years.

These yards offer ship building and repair services and engine replacement.[518]

Information is available on the individual Argus yards, including the following:

Asticar: Asticar in Havana is the only Cuban yard offering repair and maintenance services to large commercial vessels. Asticar provides specialized naval repair services including services from floating docks which can accommodate vessels up to 4,500 tons.[519] There are two docks, one 83 m and another 116 meters.

Astigal: Astigal is located in Havana and can handle vessels up to 150 GRT. There are three cradles for vessels up to 25 m in length.

Astigolf: Astigolf is located in Havana. There is a slipway for vessels up to 30 m in length.

Astimar: Astimar appears to be the former Mariel Shipyard Enterprise. Astimar can handel vessels up to 400 GRT. It has a longitudinal slipway has 8 positions for vessels up to 45 m long.

Astinor: Astinor is located in Holguín. There are seven slipways for vessels as long as 25 meters. A second slipway has 6 sideways for vessels up to 35 meters. Cranes can handle 25 tons. Press reports indicate that Astinor began to produce 21-m fiberglass shrimp trawlers in 1998.[520]

Astisur: Astisur is located in Cienfuegos. A slipway can handel vessels up to 25 meters. A second slipway at the Laredo workshop handles smaller vessels.

Chullima: Chullima is located in Havana on the Río Almendares. It was opened in 1961 and constructed numerous small steel hull boats for the MIP. The slipway can handle vessels up to 30 m in length.[521]

The authors have few details on the work that was carried out at these yards to support the FAC longliners. Much repair and maintenance work had to be contracted in foreign shipyards. Domestic Cuban shipyards, however, apparently also provided some repair and maintenance services for FAC vessels, especially by the 1980s. Presumably this work was primarily carried out at Asticar which is equipped to deal with large distant-water fishing vessels as they did extensive work on Soviet trawlers even larger than the FAC longliners. Press reports indicate that the Mariel and Chullima shipyards have worked on converting shrimp trawlers to baitboats.[522]

Photo 26.--Cuban shipyards in recent years have been trying to attract foreign contracts with competitive pricing. We do not yet know how successful this effort has proven.

D. Imports

Cuba's large fishing vessels have all been imported. Cuba began importing large fishing vessels during the early-1960s in an effort to create a high-seas fleet based on the Soviet model. The Soviets, however, supplied relatively few vessels. The Cubans ordered the vessels from foreign, mostly Spanish, shipyards. The Cuban distant-water fleet, including all the longliners, were imported from other countries. Some of these were large orders (especially the Anchoa class longliners and Río Damuji class stern factory trawlers) requiring the substantial commitment of investment capital. Except for a few trawlers obtained from the Soviets and eastern Europeans, the contracts with foreign shipyards required payment in scarce hard currency.[523]

E. Services to foreign vessels

With the decline of FCP and FAC and the retrenchment of Russian distant-water fishing, workloads at Cuban yards declined--especially at Asticar. Cuban authorities are interested in attracting foreign clients. Internet postings in English detail the services offered and competitive pricing.[524] The authors have no information, however, on the success of Cuban shipyards in attracting foreign clients. The authors have, however, noted Taiwan longliners during the 1990s moving in and out of Havana harbor. They may well have had maintenance contracts at Asticar. The authors do not know what other reason would cause a Taiwan longliner to call at Havana.

VI. Fleet Operations and Gear

A. Artisanal

1. Background

Cuba used to have a substantial artisanal fishery, in the sense that the term "artisanal" has been used throughout this report--a small-scale fishery conducted by independent fishermen.[525] This changed with the 1959 victory of the Revolution. Most boats, even the small boats used by the fishermen, were nationalized. This action by the Revolutionary Government initially had less impact on the fishing industry than might be imagined because many fisherman did not actually own their own boats. There are no longer large numbers of independent small-scale fishermen in Cuba.[526] The Government restricts access to the resource and the ownership of all fishing vessels, even small ones. This is in part a measure to protect stocks, which have become heavily exploited, but it is also a security measure to control emigration and intra-island movement. Boats even small ones can and have been used to leave the island by refugees.

Revolutionary officials organized fishermen into cooperatives. The Revolutionary Government desired to improve the lot of small-scale fishermen, many of whom were desperately poor. Expanding the cooperative movement enabled the Government to exert control over the fishermen and their existing craft.[527] The Government also introduced improved vessels, gear, and equipment, including longlines. Many of these fishermen who were organized into cooperatives had not actually owned their own boats. The Government assistance provided these fishermen allowed many to materially improve their operations. New boats and gear were acquired. Working conditions and safety were in many cases substantially improved. Even though some boat owners used their boats to flee the island, fisheries output did not decline as Revolutionary officials implemented his new economic policies. In contrast, the Revolution's agrarian policies caused a disastrous decline in agricultural production. In fact, during 1959, the first year of the Revolutionary Government, there was a large catch increase (appendix C1a1). Officials thus saw fisheries as one bright spot in the depressing economic news and shortages of the early 1960s. Thus fisheries assumed a prominence in the domestic media never seen before.

Artisanal fishermen working in cooperatives, the FG, or now fishery associations have employed a variety of different small longlines. The Cuban fishermen used hooks of Japanese and Norwegian manufacture

Pelagic longlines: The artisanal pelagic longline fishery off the northwest coast focused primarily on swordfish and billfish, but there was a substantial shark bycatch (appendix C4a1a-b). Interestingly tuna was a very small part of the catch in both billfish and swordfish sets (appendix B1a2). Fishermen commonly use number 12-14 hooks. The soak times on average were about 10 hours. The boats did not have winches and the lines were retrieved manually.

Swordfish: The swordfish longlines were pelagic

Photo 27.--The artisanal pelagic longline fishery off the northwest coast took shark, swordfish, and billfish, but few tunas. The small boats employed did not have mechanical winches.

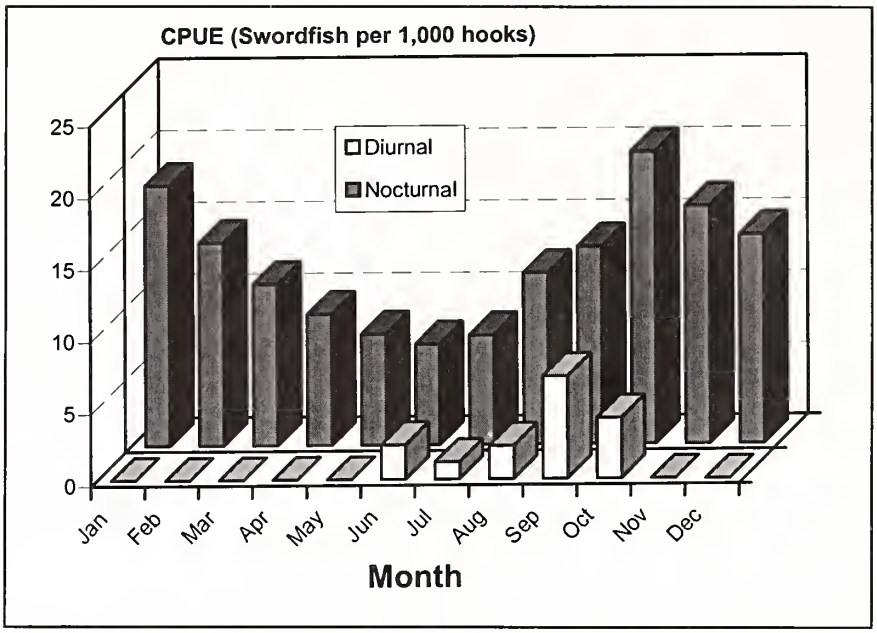


Figure 29.--The artisanal fishermen took swordfish in night sets. The results were highly seasonal.

gear set at night. Cuban sources report using light in these sets, but the Cubans use surface lanterns and not light sticks. Differing results were reported by Cuban authors concerning the relation between swordfish catches and lunar cycles, in part prompting the interest in light attraction.[528] Fishermen usually set around 250 hooks, but this depended on the size of the boat and crew, quite a range of different boats were used.[529]

Billfish: Billfish sets were made during the day. Usually only about 100 hooks were deployed because the deeper sets make it more difficult to retrieve the lines. The boats did not have power winches, making it a laborious undertaking to being in a deep-set line.

The swordfish/billfish fishermen reported bycatches of tuna (yellowfin, bigeye, and albacore) and sharks (silky, whitetip, bignose, bull, night, makos, bigeye thresher, hammerheads, tiger, and blue), wahoo, and dorado (appendix G). This looks similar to the bycatch reported by U.S. commercial longline fishermen (appendices F1b and C11e). The bycatches varied substantially between the daytime sets for billfish and the night time sets for swordfish. Especially large numbers of sharks were reported in the night time sets. Shark bycatches were much more limited in the deeper daytime sets for billfish.

Demersal longlines: Artisanal fishermen also conduct longline fisheries both off the northwest coast and off Mexico on the Campeche Bank. The gear deployment, configuration, and hooks varied substantially in these different fisheries. Bottom longlines were set for snapper/grouper, sharks, and rays.

Fondo de alto: The offshore demersal longline fishery is called "fondo del alto" (highseas bottom) and sets occur at depths 270-540 meters. It was the deepest lines deployed by the artisanal fishermen. Fishermen focus on large sharks, especially of six gill sharks or "marrajo" (*Hexanchus griseus*). The catch also includes dogfish, misty grouper, and other species. Number 12 hooks are commonly used.

Fondo de raya: The inshore fishery is called "fondo de raya" (bottom ray) because these bottom sets take large numbers of rays. The sets are made along the coast at depths of 7-32 meters. Crews of about 3 persons make about 6 sets with lines of about 100 hooks between sunset to sunrise. The principal catch is stingrays or "rayas" (*Dasyatis sp.*), stingrays or "lebisas" (*Himantura schmardae*), spotted eagle rays or "obispo" (*Aetobatus nainari*), nurse sharks or gata (*Ginglymostoma cirratum*), hammerheads or "cornudas" (*Sphyrna spp.*), reef shark or cabeza dura (*Carcharhinus altimus*), sandbar or arenero (*C. plumbeus*), snappers, and groupers.

Fondo chernero: The snapper grouper longline fishery was conducted at 16-110 m, extensively on the Campeche Bank off Mexico. Fishermen use number 3 hooks. Fishermen operate from mother boats in small 5-m catcher boats. Soak times are about 25 minutes allowing the fishermen to make about 7 sets daily.

Fondo de tiburón: This fishery was also conducted extensively on the Campeche bank off Mexico at depths of 54-180 meters. These boats were generally equipped with power winches to retrieve the line. Fishermen on average deployed about 400 hooks. They targeted six gill and other demersal sharks, such as sandbar, bull or "cabeza de batea" (*C. leucas*), lemon or "galano de ley" (*Negaprion brevirostris*), tiger or "tigre" (*Galeocerdo cuvieri*), hammerheads, nurse shark, and Florida smoothhound or "mamón" (*Mustelus norrisi*). Number 38 hooks are commonly used.[530]

The legal limitation on boat ownership in Cuba would appear to make it impossible for illegal small-scale fisheries to occur, even if the Government did not limit access to the resource. Surprisingly, however, even 40 years after the Revolution, individuals despite serious potential penalties, continue to fish. In fact

there may be more illegal fishing today than in the past.[531] The Cuban press regularly reports legal actions against Cubans who attempt to fish illegally. This is fairly unusual in a country whose media down plays reporting on criminal activity. The Oficina de Inspección Pesquera in one province alone (Matanzas) during 1999 fined fishermen nearly 0.5 million pesos and seized 3.2 t of lobster and nearly 2.0 t of fish and mussels. Also seized was 100 boats and "floating objects".[532] The reference to "floating objects" is interesting. It is not easy to obtain a boat in Cuba, so those deciding to fish illegally have to improvise. The boat seizures may even mean that the authorities have seized boats operated by APPs (provincial fishing associations). These boats are in fact legally owned by the government, not the associations.[533] The continued incidents of illegal fishing is probably a function of the high prices for which seafood can be sold in Cuba. One observer attributes it to the relaxation of the ban on private fishing during the Special Period so people could supplement their meager food rations. The opening of the tourist industry and the legalization of dollars, helped to create a thriving black market for the illegal caught fish.[534]

Cuban authorities in the past allowed individuals to fish from shore for personal consumption. Cubans were not, however, allowed to sell their catch and the authors have noted cases where anglers who sold even a few fish were arrested. Regulations or enforcement have since been relaxed. Cubans can apply for sport permits and own a boat for such purposes. There are restrictions on the species taken and gear used. Most of the catch is sold privately.[535] Visitors to Cuba in 2000 report seeing individuals fishing from small boats even in Havana.[536] Notably the boats are sail-powered and do not have outboard motors. In addition anyone can fish from shore with a hook and line without any license. Cuban authorities apparently do not take action unless some minimal quantities of fish are surpassed or unless protected species like lobster are involved. Such authorized small-scale fishing is conducted overtly with little concern about police interference. Anglers are apparently not usually bothered if they sell a few fish--as long as they are not the controlled export species and large quantities are no involved. There can be a fine line between recreational fishing and fishing for personal consumption, a distinction officials are attempting to deal with in new recreational fishing regulations.[537]

Photo 28.--Independent fishermen were operating without police intervention in 1993 using sail-powered boats. Other reports indicate similar fishermen operating openly in Havana during 2000.

2. Pelagic hand lining

Cuban artisanal fishermen conducted a pre-Revolution handline fishery along the northwestern coast for oceanic pelagics. This fishery and the fishermen involved were celebrated by Earnest Hemingway in his *Old Man and the Sea*. The fishery dates to at least the 1870s.[538] No information is available to the authors on that early period. The artisanal fishermen conducted small-scale, sometimes subsistence operations, generally using small open boats powered with only sails or oars.[539] Some fishermen fished alone and the largest boats accommodated only three persons.

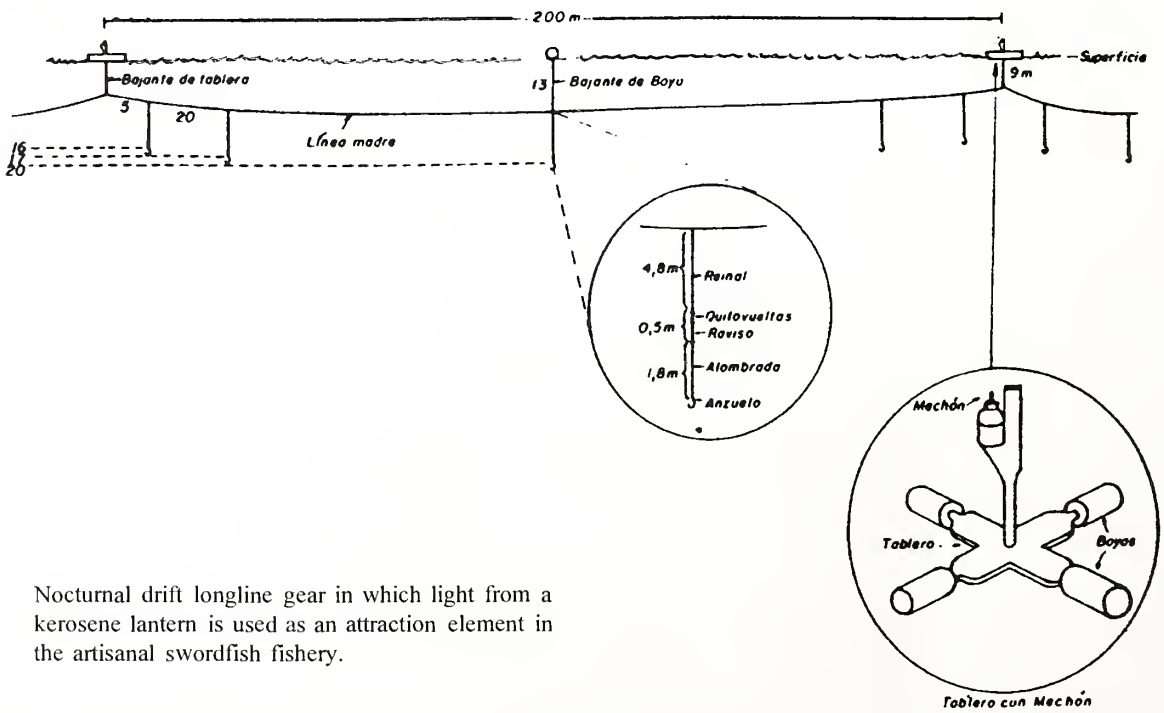
The fishery was conducted from small coastal villages at various locations along the coast, but especially off the northwest coast from Matanzas east to Bahía Honda. The most important port was Cojímar, described in the 1940s as a picturesque fishing village a few km west of Havana. Other fishermen operated out of the Almendares River from which some rod and reel fishermen also operated. A few fishermen also fished from Havana and Cabanas, about 65-km west of Havana where fishing was also reportedly good.[540]

The artisanal fishermen would go out early in the morning, about 4:00 am and fish drifting with the current. The winds often rise, about 12:00 noon, at which time they would return to port. Three handlines were traditionally deployed at different depths.[541] By the 1940s, some fishermen were putting out buoys and handling as many as 20 lines at depths from 20- 200 meters.[542] Although the recreational fishermen did not use the term, this appears to have been a locally developed, primitive longline system. One observer reports that the preferred bait was sandfish.[543] Another indicates that mackerel was normally used with a 14/0 hook. Some fishermen would add a few pilchards to the point of the hook for "appetizers".[544]

The principal target species was blue marlin which a Cuban scientist named "Cuban black marlin".[545] Another 1940s account indicates that the fishermen targeted marlin, swordfish, wahoo, mackerel and dorado.[546] The marlin fishery was highly seasonal. August and September were reportedly the best months for large blue marlin. One recreational fishermen, describing the artisanal operations, indicates that the fishing was the best when the "Stream was running", meaning the Gulf Stream was pronounced and strong. Otherwise he reports that the fish will not be on the surface and the catch drops at greater depth.[547]

One report suggests that the catch might consist of 3-4 fish. This appears to have been the catch of fishermen which were deploying multiple lines. The small scale fisherman who only put out 3 lines, probably would not have averaged one large fish per trip. One report indicates that Cuban's relished blue marlin. White marlin and other species taken by the line fishermen also appear to have been popular. There were two commercial markets in Havana, which one observer in the 1940s reports was, along with the Honolulu market, "... the two most interesting I have ever visited. Fish of all kinds and descriptions are being traded in as if they were on the London Stock Exchange."[548] Some fish were also sold to vendors or retailed as slices on the street.

The authors find it interesting that the only traditional Caribbean fishery for oceanic pelagics that we have been able to find information about is this Cuban fishery. No where else in the Caribbean does such a fishery appear to have developed. The authors are unsure as to just why it developed in Cuba. Certainly the location of northwestern Cuba along the Gulf Stream, and thus excellent fishing grounds close to the coast, was one important factor.



Nocturnal drift longline gear in which light from a kerosene lantern is used as an attraction element in the artisanal swordfish fishery.

Figure 30.--Artisanal longline fishermen set most of their hooks near buoys with kerosene lanterns at relatively shallow depths, averaging about 250 hooks per set. Pol and Moreno

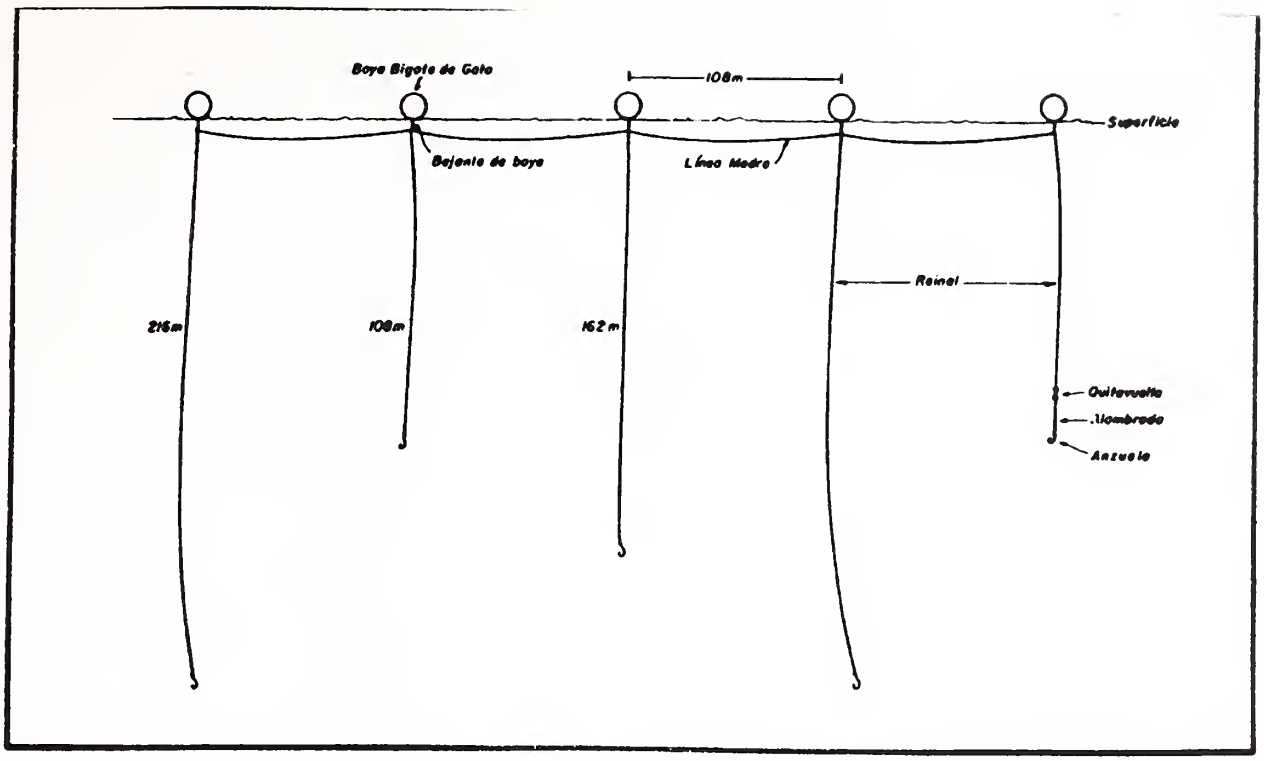


Figure 31.--Artisanal longline fishermen make billfish sets during the day and at greater depth than when targeting swordfish. Pol and Moreno

3. Pelagic longlining ("palangre corto")

Coastal Cuban fisheries are sometimes referred to as artisanal, although they are in essence small-scale commercial operations. Pelagic and demersal longlines are the most commonly deployed gear in oceanic waters.[549] One such fishery is a longline fishery, carried out off the northwestern coast but later extended to other coastal areas. The nocturnal fishery focused on swordfish and a diurnal fisheries took billfish and sharks.[550] One Cuban source reports that the fishery has a long history and was introduced by Spanish fishermen in the early 1900s. [551] The fishermen along the northwestern coast, like other Cuban artisanal fishermen, after the Revolution, were organized into cooperatives during the early 1960s.[552] Some Cuban reports indicate that the artisanal longline fishery was conducted by the Flota del Golfo, the state fishing fleet operated in the Gulf of Mexico, rather than cooperatives. Cuba's artisanal longline fishery appears to have origins dating back to the 19th century fishermen began deploying lines from small boats. This evolved into a Cuban longline ("palangre criollo") with 3-4 hooks.[553] One report describing "commercial" fishermen operating for swordfish out of Cojímar in 1942, although the gear is not specified.[554] Another report suggests longline fishing in the 1950s and other fisheries for large pelagics dating back to the late 19th century.[555] Cuba began reporting its first significant swordfish catch in 1959, about 300 t (appendix C8a), although this may be when the catch was first reported, rather than when catches actually began.[556] The fishermen used small boats ("lanchas")

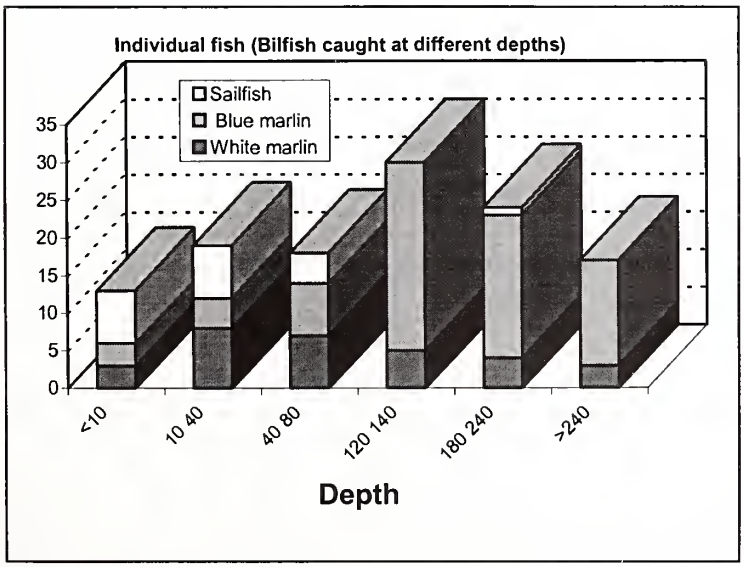


Figure 32.--The species of billfish taken by the artisanal fishermen varies substantially with the depth of the hooks.

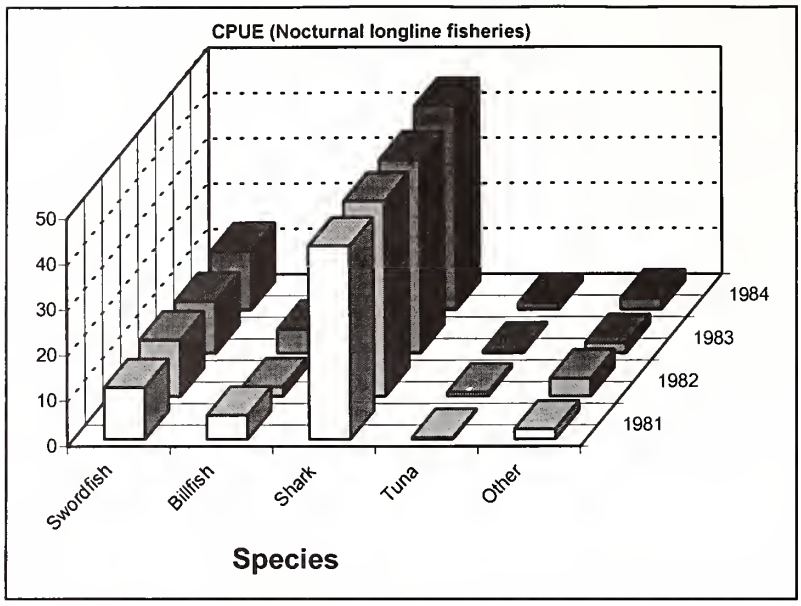


Figure 33.--The artisanal fishermen take large quantities of sharks in their fairly shallow night time sets for swordfish. Tuna catches are minimal.

until 1964 when larger boats were introduced to give the fishermen increased range.[557]

The authors have few details about the number of vessels involved in this fishery. The number varied both seasonally and from year to year. Many of the fishermen were also involved in other fisheries and did not longline all year round, complicating any calculation of the number of vessels. One author notes that about 80 vessels were regularly involved in the fishery.[558] The overall annual catch of these vessels involved in this fishery was 800-1,100 t during 1970s, but declined in the 1980s.[559] Some Cuban researchers believe the primary reason for the decline is reduced fishing effort. Cuban researchers different on yield trends. The lack of detailed catch has made it difficult to calculate time line data.[560]

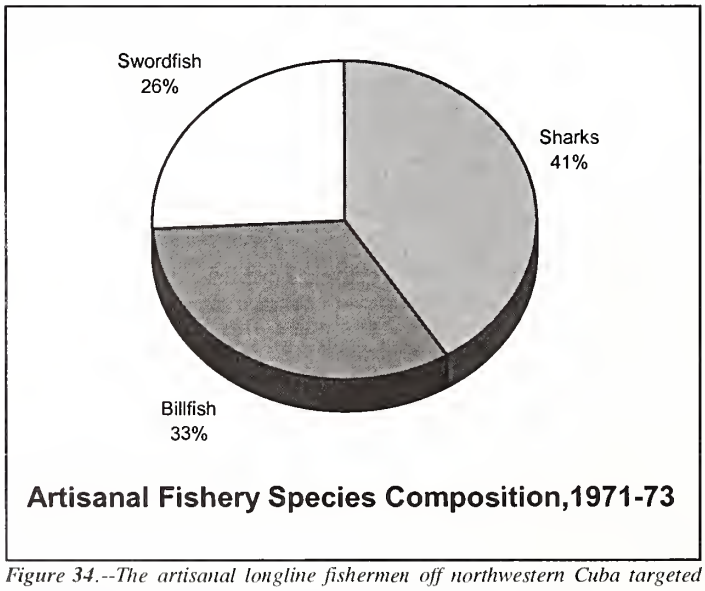


Figure 34.--The artisanal longline fishermen off northwestern Cuba targeted swordfish and billfish, but took substantially quantities of shark.

Cuban sources describe several quite distinct artisanal fisheries using varied gear and fishing strategies. The species taken thus varied radically.

Artisanal longlines: The authors are classifying most of the longlining conducted in Cuban waters with relatively small boats as artisanal longlining. Cuban authors use the term here because the fishermen use especially small boats and short longlines. The fishermen deploy 80-250 hooks per set and the retrieval is manual or "semi-automatic". The catch is primarily sharks (50 percent) and billfish (40 percent).

Night longlining: This fishery targets swordfish. The fishermen deploy 2-3 hooks every 120-240 m which are suspended from buoys with lanterns ("mechón"). The hooks are set at depths of 15-55 meters. While swordfish is the target species, catches may only total 20 percent of the total. Sharks can make up 65 percent of the catch. A normal set would have 120-240 hooks and extend 8-19 miles. This fishery is discussed in more detail below.

Shallow daytime longlining: Shallow day sets are made to target billfish. The fishery takes sailfish, white marlin, and spearfish. The three billfish species can makeup 20-40 percent of the catch. The hooks are set at 30-55 meters. Normally about 60-40 hooks are deployed in 6-13 km sets.

Deep daytime longlining: This fishery is similar to the shallow water sets for billfish. The deeper sets are made to target blue marlin. This species can comprise 40-50 percent of the resulting catch. The hooks are deployed at 50-170 meters. This is the limit of the artisanal gear deployed, but Cuban sources, based on work by Japanese researchers, believe that fish could be taken in even deeper water. Normally about 60-40 hooks are deployed in 6-13 km sets.[561]

Considerable information is available on the species composition of the artisanal fishery. Cuban researchers devoted considerable attention to the pelagic fishery off the northwestern coast. The authors were able to obtain several reports describing species composition, but several other reports were unavailable.[562]

Artisanal fishermen: One observer reported

that in the nocturnal fishery swordfish catches normally exceeded billfish catches by about 70 percent.[563] The authors, however, have noted substantial differences in the species composition over time as reported by different authors. Catches also varied greatly depending on the time of day with swordfish more important in the night sets and billfish in the day sets (appendix B1a2). Test fishing in 1962 resulted in swordfish catches totaling 30 percent of the catch, but as only part of the year was covered, this probably was not a good reflection of full year results (appendix C4a1a2). One detailed 1973 study of Cuba's artisanal longline fishery indicated that the large pelagic portion of this fishery consisted of sharks (41 percent), billfish (33 percent), and swordfish (26 percent) (appendix C4a1b).[564] A subsequent assessment in the 1980s showed that swordfish catches exceeded billfish catches (appendix C4a2a-b).[565] The fishery in the 1980s was taking about 50 t of swordfish annually.[566] This was a substantial decline from the 220 t the artisanal fishermen had been averaging.[567] The fishery is conducted year round, with the best catches in the nocturnal swordfish fishery reported from October to January (appendix B1b2). Night sets are made for swordfish and day sets for billfish.[568] The latest report that the authors have noted show relatively stable catches for most species, except blue marlin. The most recent data NMFS has been able to obtain was a report published in 1990 using from three of the largest artisanal ports (Boca de Jaruco, Jaimanitas, and Cojímar), All three ports are located along the northwestern coast and data was collected during 1981-87. The data show that the nocturnal sets continued to be dominated by shark (70 percent) and swordfish (20 percent) (appendix C4a4). The sharks were mostly night, thresher, tiger, and longfin and shortfin makos. Small quantities of tuna, dorado, and wahoo were also reported.[569]

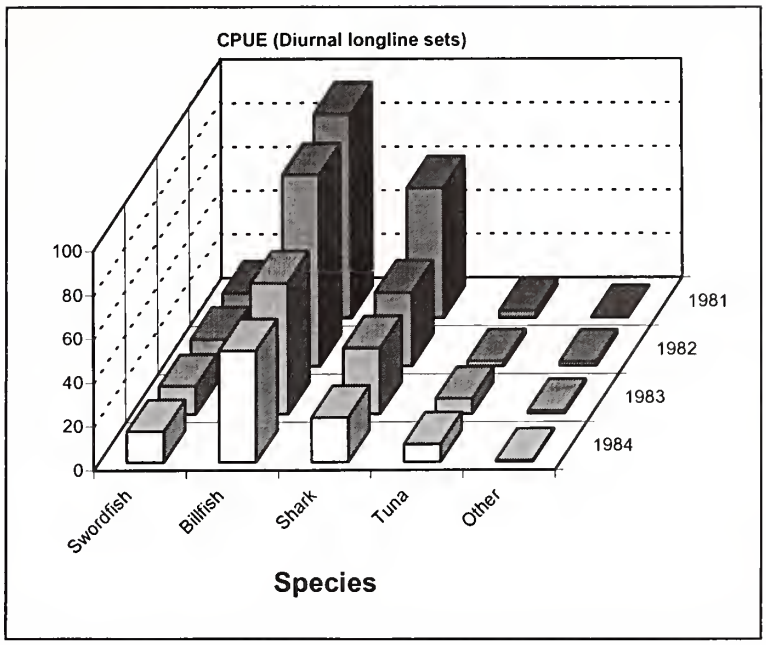


Figure 35.--The artisanal fishermen target billfish in their deeper day time sets, but shark catches can be of some importance.

Test fishing: A detailed study published in 1971 provides a look at the species composition reported by a FAO master fisherman in Cuban waters. Cuba had asked for FAO assistance to improve the catch of the artisanal fishermen. The FAO project was conducted during 1966-70 with a range of different vessels.[570] Catches at an early stage of the fleet's development in the late 1960s consisted primarily of sharks, bluefin tuna, "coastal" billfish (perhaps sailfish), swordfish, marlin, and other species (appendix C4a3a). Swordfish was nearly 15 percent of the catch. Tunas totaled under 30 percent (appendix C4a3b).[571]

Cuban fishermen have developed and deployed a variety of longline gear.[572] The Cuban longline gear was somewhat different than standard gear used elsewhere in the north Atlantic. The description here applies to operations during the 1980s. We do not know if there have been any subsequent gear modifications. The Cubans deployed mainlines ("linea madre") of varying length, on part because of substantial variations in the sizes and types of boats used in the fishery (appendix A2). Other factors affecting the length of the mainline were: the expertise

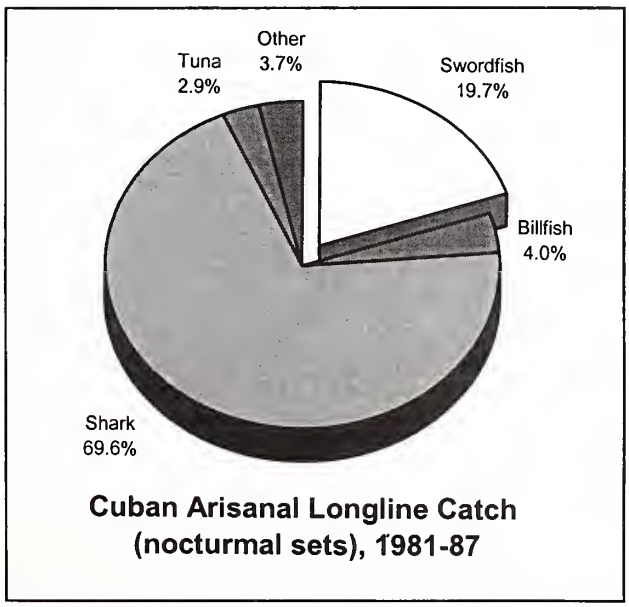


Figure 36.--Artisanal fishermen from ports along the northwestern coast reported fairly steady catches of mostly sharks and swordfish in their nocturnal sets.

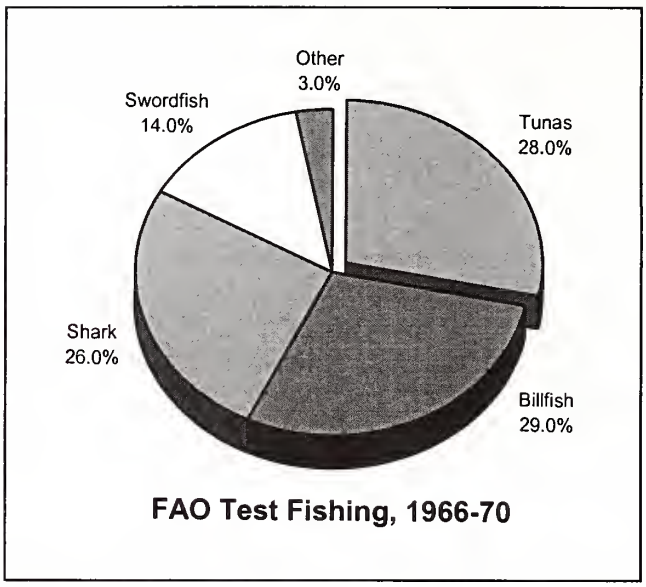


Figure 37.--FAO masterfishermen in 1966-70 succeeded in taking more tuna than the artisanal fishermen had been taking, but reported very large shark and billfish catches.

of the crew, and the mechanical gear (especially the winch) with which the boat was equipped. The mainline was supported by buoys. There were two primary buoy platforms ("tableros"). Each tablero had four attached buoys. The tableros were spaced every 360 m. Secondary buoys were spaced at various distances (108-144 m). The buoy platforms has kerosene lamps ("mechones"). Hooks were set primarily under the main buoy platforms near the kerosene spaced closely together (10-20 m) at depths of about 16-17 m under the main line. One hook line was between the platform buoys, generally at depths of 27-48 m.[573] A diagram provided by the same authors, is slightly different than the one reproduced in a ICCAT report, probably reflecting variations in the gear deployed on different boats (figure 30). Some artisanal sets were reported as deep as 240 m, these were the deeper sets targeting billfish during the day. The depth of the set significantly affected the species composition, especially of billfish because sailfish were found near the surface while blue marlin were more prevalent below 80 m (appendices B4b1-2).[574] One 1964 study suggests that virtually all of the catch was taken at depths above 200 m and most above 100 m (appendix B4a).

The main buoys were cross platforms ("tableros") with four floats on the tips of a frame. A kerosene lamp ("mechón") was positioned on the line support buoys to attract fodder fish or swordfish itself.[575] The lamps were placed about every 360 meters. The bait in the 1960s was mostly mullet or "lisa" and bonefish "macabí". The bait is hooked through and then tied on to the hook to make it very difficult to fall off.[576] One 1971 report describes Atlantic saury ("paparda"), squid, mackerel, horse mackerel, and hake ("merluza") as well as fresh bonefish ("macabí").[577] The bait in the 1980s was reportedly primarily mullet and mackerel.[578]

Operations were generally conducted 8-25 km from the coast. Fishermen with their small open boats in the 1960s would leave port at from 6:00 pm to 12:00 midnight and return any time from 9:00 am to 4:00 pm the following day. Factors such as the strength of the current and the size of the catch affected the duration of the trip. CIP researchers in the mid-1960s made a variety of recommendations such as using larger boats, making longer trips, and modifying the gear.[579] Many of these suggestions were implemented. Some fishermen continued to use small boats and returned to port daily, but larger boats

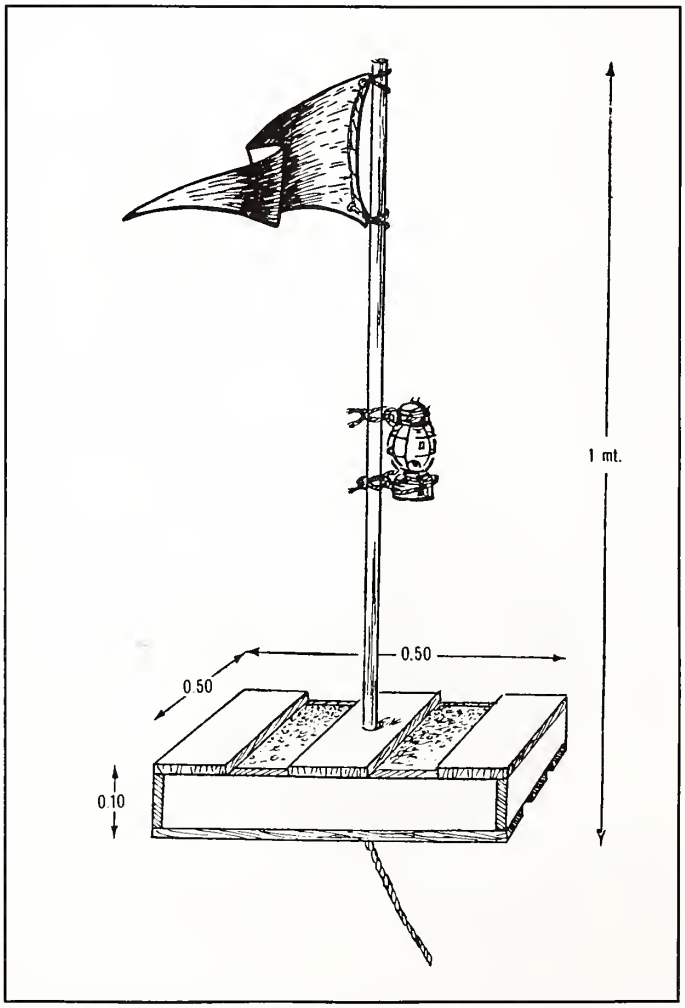


Figure 38.--The artisanal longline fishermen developed this surface light attraction device for night swordfish sets. This early example was later improved. Guitart

were deployed in the fishery. Fishermen on the larger artisanal vessels by the 1980s were making trips of 8-15 days.[580]

Cuban artisanal longline fishermen in the early 1960s were using gear they had developed themselves. This involved separate sections made up of a series of 3-5 wooden floats with one hook line suspended from each float to depths of 10-20 m (figure 31). Most boats would deploy about 12 sections for one nights fishing. CIP researchers after 1962 began encouraging the fishermen to use a longer line that the CIP developed from Japanese fishing methods employing a single main line of about 180 meters. Gear promoted by the CIP in the early 1960s consisted of a main line section with 4-5 vertical hook lines spaced about 25 m apart. Hooks were set at depths of about 20-80 meters. The beginning and end of the line was supported by a wooden float with a flag and lantern.[581] The CIP gradually made further refinements. By the 1980s fishermen were operating with mainline sections of 200 m, about the same as the 1960s, but with more sophisticated hook arrangements (figure 30).[582]

One Cuban report suggests that in the mid-1980s that the concentration of effort off the northeast coast out of ports near Havana changed. Artisanal longline operations began to be conducted off the southeast coast out of Santiago and Baitiquirí. Operations were also reported off the northeast coast from Gibara. The catch taken off the northeast coast 73 percent in 1979 to only 56 percent in 1965.[583]

Little economic data is available on the artisanal longline fishery. Cuban researchers during the 1960s reported being unable to get any economic data from the cooperatives. Researchers compiled some data in the early 1960s and found that bait was the main operating cost, but that fuel was also important (appendix A11b). Crew salaries were not considered. This is interesting because subsequent Cuban fisheries research that the authors have noted became increasingly restricted to biology and avoided treatment of economic issues, especially questions concerning operating costs and profitability.[584]

The artisanal longline for swordfish and billfish appears to have peaked in the 1960s. In the case of swordfish catches there has reportedly been a significant decline in the catch.[585] The authors have attempted to determine the current status of the artisanal longline fishery. The latest published Cuban references to this fishery date to the late-1980s. The authors have no Cuban publications describing the fishery during the 1990s.[586] This does not mean, however, that the artisanal longline fishery has ended because the publication of Cuban fisheries research has been drastically curtailed as a result of the Cuban economic crisis of the early and mid-1990s. Some scattered information is available which suggests that if the artisanal longlining is continuing, the level of activity is substantially reduced. A Cuban researcher tells us that Cuban research on the fishery did not continued in the 1990s.[587]

Cuban officials: CIP officials report that the artisanal longline fishery continues to operate off the northwestern coast.[588] MIP officials also confirm that 10-15 artisanal longliners have operated in the late 1990s. There operations are highly seasonal and they land about 300-400 t of tunas, billfish, swordfish.[589] Cuban officials in a soon to be published article indicate that pelagic longlining continues, but is increasingly shifting to sharks. The fishery for swordfish and billfish continues to be conducted mostly off the northeast coast, but there are operations in other areas, primarily for shark. Most of the shark, however, is taken with demersal longlines.[590]

Cuban catch data: The authors note that catches of 300-400 t of tuna (yellowfin and bigeye), billfish, and swordfish mentioned above do not seem to be appearing in Cuban catch data. The catch of valuable tunas (yellowfin and bigeye), swordfish, and billfish reported to FAO during 1997 and 1998 was only about 64-109 tons (appendix C2a2b). Even if a large shark catch is added,[591] the resulting total still only would come to less than 150-200 t at most, unless the fishermen had changed their fishing strategy.

Cuban fleet data: Data Cuban officials provided to ICCAT suggest that the artisanal longline fleet was substantially reduced in 1983 and retired in 1986 (appendix A1). Cuba stopped reporting to ICCAT in 1990 and the authors have no current fleet data.

U.S. Coast Guard: Coast Guard officials report in 2000 seeing Cuban artisanal vessels, possibly longliners, still operating relatively close to the coast. There is reportedly little Cuban fishing now conducted at any distance off the northwest coast into the Gulf.[592] The artisanal longline fishermen formerly conducted operations along the coast and into the Gulf of Mexico. (See "XVII. Enforcement".) The U.S. Coast Guard observations suggest that Cuban artisanal fishermen are now limited primarily to Cuban coastal waters. Cuban fishermen do continue to fish further west off Mexico, but this is a line fishery for demersal species like grouper. Other Coast Guard officials have not in recent years reported artisanal or commercial longliners in the waters south of Cuba, but point out that spotting and identifying Cuban fishing vessels in Cuban waters is not a focus of their activities and thus this is not a confirmation that Cuban longliners are not present.[593]

U.S. fishermen: U.S. longline fishermen operating off

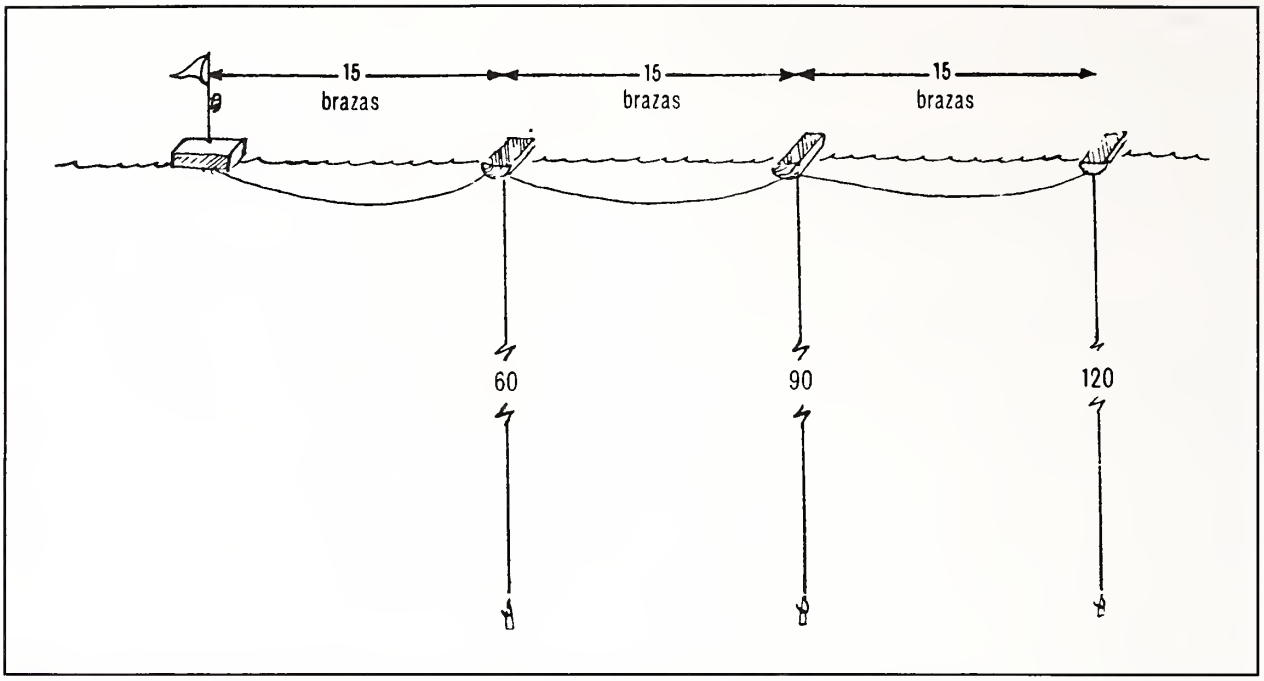


Figure 39.--This simple longline gear was developed by Cuban fishermen and widely used in the 1950s and early 1960s. "Brazas" is Spanish for fathoms. Guitart

Cuba used to see small Cuban longliners. One source indicates that the U.S. fishermen with which he works have for several years not mentioned seeing the small Cuban longliners.[594]

Visitor report: A visitor in 1993 reported seeing an extensive price list at the Havana dollar fish store, El Submarino include species taken in the longline fishery, including swordfish ("emperador"), tuna ("atún"), and billfish ("aguja"). "Serrucho" was listed and sounds like sawfish, but was king mackerel (appendix G1). Interestingly shark was not listed, unless they used a local term for shark with which the authors are not familiar (photo 29). Interestingly the store had no fish at all when visited in the morning, but one of the attendants insisted that an afternoon delivery was expected.[595]

The authors have few details on the entities operating the artisanal longliners. One 1980s report indicated that the following enterprises were involved in the artisanal longline fishery, all located along the northwestern coast: Boca de Jaruco, Cabañas, Cojímar, and Jaimanitas.[596] These enterprises reportedly worked as part of the Flota del Golfo (FG). Cuban fishermen continue to conduct some small-scale fishing commercial activities, either through state corporations or state-controlled provincial producer associations. As part of the economic reforms of the 1990s, cooperatives and vertically integrated enterprises ("combinados pesqueros") were replaced by producer associations.[597] Some former FG fleet activities appear to have been converted to the producer associations. This appears to be part of a MIP policy to reduce the number of employees at state companies and employ former staff at these producer associations. They are now referred to as Provincial Fishing Associations ("Asociaciones Provinciales de Pesca-APPs"). The Cuban Governments now provides economic incentives or bonuses to associations who exceed their quota.[598] Some of the bonuses are even paid in dollars which is hoped will dissuade the fishermen from selling part of the catch on the black market.[599] These bonuses are the principal difference between the old cooperatives which paid straight salaries and the new associations.[600] Such payments may have initially gone to managerial-level personnel like the vessel captains, but crew members are now getting at least some of their earnings in dollars.[601]

4. Trolls and gillnets

Artisanal fishermen also conduct a small fishery using both trolls ("curricán") and gillnets ("red de enmalle") to target Spanish mackerel ("sierra") (appendices G1-2). Until 1971 the catch was primarily taken with trolls, but gillnets have since become more important. The fishery is conducted on the Cuban insular shelf, primarily off the southeast coast. Catches as high as 800 t have been reported but by the late 1980s had declined to about 400 tons.[602]

Photo 29.--Fish stores ("pescaderías") in 1993 were still offering species taken in the longline fishery (swordfish, tuna, billfish, and sawfish). They were among the most expensive offered.

B. Commercial

1. Oceanic pelagic fisheries

Cuba has reported a variety of fisheries taking oceanic pelagics like swordfish and tuna. The FAC primarily focused on yellowfin tuna with longliners, but also operated one seiner. The FG operated baitboats. Artisanal fishermen associated with the FG or cooperatives/producer associations operated small longliners. These fleets conducted live bait, seiner and longline operations. Cuba continues to report substantial shark and ray catches (appendix C2a2b and C11a). The Cuban shark catch is now taken almost entirely in Cuban waters (appendix C11b), presumably with longlines, but the authors are unsure as to the corporate entity involved. Only the longline operations took significant quantities of swordfish.

Baitboats: Cuba employed baitboats ("boniteros") beginning in the 1930s which came to supply about 30 percent of the tuna canned in Cuba. Catches by the 1950s were 1,000-1,500 t annually.[603] The species taken were mostly skipjack and black skipjack, along with smaller quantities of blackfin tuna. The vessels operated mostly off the southwestern coast. The fishery was conducted from the northwestern to the south central coast, but outside the shallow water of the Gulf of Guanacabibes and the Gulf of Batabano.[604] Some fishing also occurs off the northeastern coast.[605] The fish schools are usually located by the presence of seabirds.[606] The species composition in the fishery is highly affected by fishing zone. Off the southwestern coast the catch is skipjack and blackfin with small quantities of yellowfin. Along the northwest coast the catch is skipjack and blackfin with virtually no yellowfin. Off the north central and eastern coast, the catch is mostly skipjack with small quantities of blackfin and yellowfin.[607] The fishermen used live bait to attract the fish which were then harvested by hook and line ("vara y cordel").[608] The authors have not noted any recent Cuban report on this fishery, but continued reporting of skipjack and black skipjack catches (appendix C2a2b) suggests that the live-bait fishery still exists.

Seiners: FCP had hoped to launch a major tuna purseseine fishery in the Eastern Pacific. A purseseiner, the *Jagua,* was purchased in Japan during 1970 (appendix A4a). The seiner was deployed in the eastern Atlantic, in part to train the crews needed for a large new fleet of purseseiners. The Spanish were reportedly influential in fishing methods adopted.[609] Cuba ordered 16 seiners from Peruvian shipyards in the 1970s, however, only a few were ever built. Cuba refused to accept delivery on the vessels that were completed because of the delayed deliveries and significant cost overruns. Cuban officials have not given up on a purseseine fishery, and press reports concerning the acquisition of such vessels appear from

time to time.[610] Any significant Cuban purchase of tuna purse seiners, however, seems highly unlikely at this time.

Longliners: The Cuban longline fleet operations were significantly influenced by the Japanese tuna fishery. The Cuban commercial longliners were ordered during the 1960s. A few used vessels were ordered in the early 1960s, but the bulk of the fleet were large new vessels constructed in Spanish shipyards in 1965-66 (appendix A4a). The operations proved so disappointing that plans for additional longliners were canceled (appendix A4b) and no additional new commercial longliners were ever ordered by the Cubans. A few shrimp trawlers, however, were covered to medium-sized longliners during the 1980s. While most Cuban longliners were built in Spain, the Japanese were the primary influence in the development of the Cuban longline fishery--especially the methods and fishing strategies employed. Japanese fishermen served as fishing masters aboard many of these vessels and many also had Japanese master fishermen who served as instructors. The Japanese experts helped develop the gear and methods employed on the new Spanish-built longliners when they arrived in 1965-66. The strategy and gear adopted in the 1960s, however, was retained in the 1970s and 80s. As the Japanese technology and strategy evolved, especially to fish bigeye in deeper water, Cuban sources report that the FAC never adjusted their operations.[611] The authors have noted fewer references to Spanish fishermen working with the Cuban tuna fishermen, but various observers mention their presence.[612] The Japanese worked aboard both the commercial and artisanal longliners.[613] Their primary impact was aboard the FAC commercial longline fleet which dominated the Cuban tuna fishery. About 70 percent of the Cuban tuna catch was taken with longlines during the 1970s-80s, but this declined sharply in the 1990s (appendix C2b) as the longline fleet was retired.

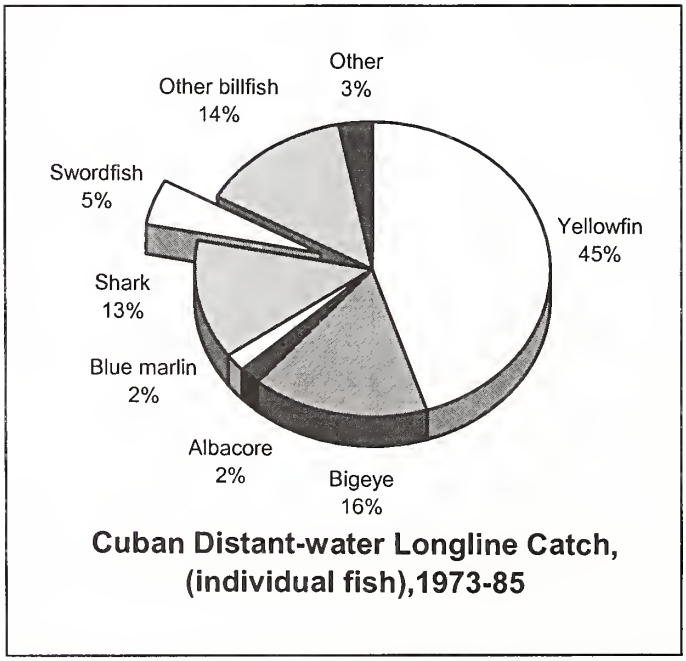


Figure 40.--The Cubans planned from the beginning to target yellowfin tuna in their distant-water longline fleet. Although yellowfin averaged 45 percent of the catch, this proved less than anticipated.

2. Distant-water operations

a. Catch composition

The Flota Atunera Cubana (FAC) since 1973-74 has operated Cuba's fleet of commercial longliners. The commercial longline fleet was, from an early stage in its development, primarily deployed in the tropical Atlantic between West Africa and northeastern South America (figure 41). Cuban operations on these grounds was focused primarily on yellowfin tuna.[614]

Catch data: Yellowfin made up as much as half of the tuna and tuna-like catches in terms of weight (appendix C8e). Until the fishery began to decline in the late 1980s, yellowfin was commonly 30-50 percent of the catch. Early fleet data shows bigeye and other tunas being taken, sometimes in fairly large quantities (appendix C9b).[615] Cuban sources report that from 1973-85 yellowfin averaged 45 percent of the catch (appendix C4b1). Catches of swordfish were a smaller, but not unimportant part of the catch. Swordfish also varied from year to year. Swordfish as reported by ICCAT and FAO averaged about 12-13 percent of the catch, although were substantial annual variations (appendices C7a and C8e). From 1980-96 swordfish varied from 2-29 percent of the longline catch (appendix C8e). Cuban sources note an average of about 12 percent from 1982-86 (appendix C4b1).

Research data: Cuban researchers working with FAC longliners collected data based on the number of individual fish. Over an extended period (1973-85), yellowfin clearly was the dominant species representing 45 percent of the fish caught. Other important species were bigeye (16 percent), billfish other than marlin (14 percent), and shark (13 percent). Swordfish was only 5 percent of the fish taken (appendix C4b2).[616] As swordfish are larger than tunas, the swordfish proportion in weight would have been larger.

Photo 30.--Cuban commercial longline fishermen preparing the hook leader lines in preparation for a highseas set.

b. Grounds

Yellowfin catches, because that species was the primary target, are a good indicator on overall Cuban longline deployment. Cuban distant-water longline operations centered on tropical areas in both the eastern and western Atlantic (appendices C9c1-2). Operations were conducted in the Gulf of Guinea and central Atlantic between West Africa and northeastern South America, mostly on the highseas (figure 41). Swordfish catches have varied in the north/south and east/west regions of the fishing area (C8d appendices).[617] Swordfish catches are available by ICCAT 5° square. The authors have compiled data on Cuban swordfish catches in the wider-Caribbean (appendix C8f). Some Cuban catches have been reported in the Wider-Caribbean, outside the Antillian arc--mostly at equatorial latitudes. There has also been extensive fishing in the south Atlantic--again at equatorial latitudes of the south Atlantic (appendix C8b). The catch in the south Atlantic was particularly significant during the mid-1980s.

The FAC exhibits a remarkable consistency over time in both areas fished and seasonal effort patterns. This consistency seems at odds with how a distant-water fleet should be efficiently and profitably managed. There are many examples of this. The FAC, for example, reported swordfish catches in ICCAT 5° square 0550 (western Atlantic east of the Antilles) only in the fourth quarter from 1959-76) or in 1050 in the first three quarters from 1959 through 1976. There are numerous similar consistent patterns in other ICCAT squares (appendix C8f). This is different than the pattern reported by other countries longlining in the wider-Caribbean (Caribbean overview, series D appendices). The Japanese, Korean, and Taiwan longline fleets exhibit some consistency in areas targeted, but the fisheries patterns is not precisely the same year after year. This is understandable because fishing strategies change over time because of shifting market trends and environmental changes which alter the distribution and accessibility of target species. These fleets could make such decisions because they were constantly supplied by data which enabled them to understand shifting patterns of abundance. Cuban captains never had this advantage and had to rely primarily on their own experiences. The small CIP staff working with large pelagics did try to help as best they could with their limited resources.[618] In addition, the Asian longline fishing plans took into account fluctuating market trends such as prices for different species. The remarkable consistency in Cuban fishing patterns which would seems to suggest that the Cuban fleet managers made little effort to adjust to changing conditions. The continual focus on yellowfin throughout the 1970s and 80s is a clear indication of this. Several

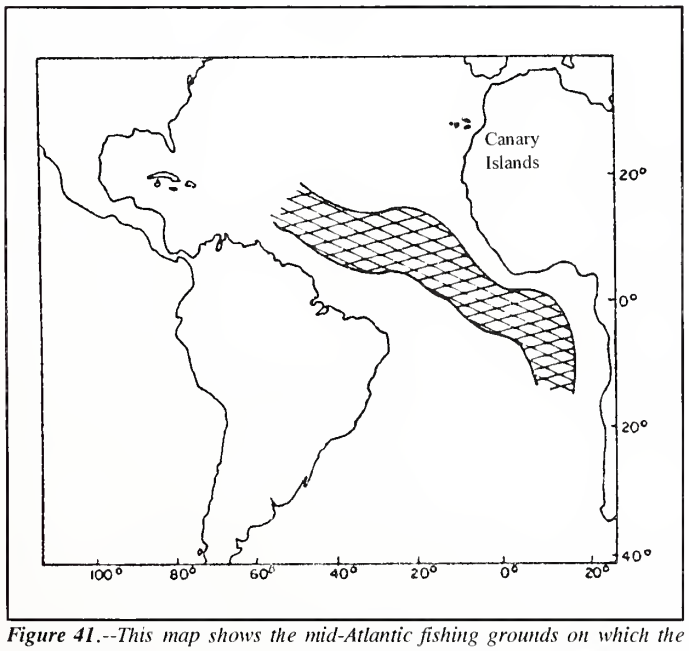


Figure 41.--This map shows the mid-Atlantic fishing grounds on which the Cuban distant-water longline fleet focused. Rodríguez, Nieto, and Muñoz

possible factors may explain this consistency.

Central control: The consistency does not appear to be a fleet management plan which provided vessel captains highly specific orders and permitted little deviation from those orders. The authors note that some of these distinctive fishing patterns began in 1959 (appendix C8f), before a state fishing fleet was established. In fact Cuban captains were given considerable flexibility concerning where they fished, as long as they successfully fulfilled their quotas.[619]

Inaccurate data: Another possible explanation for such a consistent statistical pattern would seem to be that Cuban fleet officials have simply created the data for unknown reasons and submitted it submitted to ICCAT.

Use of Japanese data: The most likely explanation for the consistency in annual operations is that each Cuban captain was using the same dated catch results reported by Japanese fishermen. Japanese and Taiwan fishermen had access to a sizeable research establishment. Catch data was compiled and accessed on a monthly basis, permitting their fishermen to make timely changes in fishing strategy and grounds. An entire, well funded research laboratory in Japan was devoted to supporting the distant-water tuna fishermen. Cuban fishermen had only a few researchers with very limited support working on tunas and related species. As a result, the Cuban captains for years relied on the same Japanese data which is apparently reflected in the continuity in fishing patterns over the years.[620]

c. Operational controls and support

The Cuban vessels operating in the eastern Atlantic, after the Las Palmas center was opened in 1970, were directed from that center. The FCP in October 1973, however, decided that it would be more efficient to control the longliners centrally from Havana. From that point Las Palmas has been used only as a resupply, transshipment, and repair point. The FCP decided at the time that more efficient and precise controls were needed for a fleet that totaled 23 commercial longliners, 1 purse seiner, and 1 support vessel. The Cubans reported major efficiencies as a result of the reorganization allowing them to increase production.[621] These adjustments, however, did not make the longline operations profitable.

The FAC fleet was directed by a centralized command center. For several years a center was established in Las Palmas to direct the eastern Atlantic fishing effort. Later the fleet was directed from Havana. Captains reported daily on fishing results. If one captain encountered particularly good results, other vessels could be directed to the same area of operations.[622]

The FAC, in its eastern Atlantic operations off West Africa during the 1970s and 80s, coordinated fleet operations with the Soviet distant-water fleets. As the Soviets were not longlining for tuna and swordfish, there was little coordination of actual fishing operations. While the FAC had its own fleet of tankers, the Cubans also relied on Soviet tankers for at sea refueling. Two of the Cuban takers were attacked and damaged by Moroccan fighter aircraft off the Western Sahara in 1980.[623] The tankers required extensive repairs as a result, FAC may have been particularly dependent on Soviet tankers. The refueling was based on contracts between the FAC and the Soviet fishing fleet.[624] Information on other support activities is unavailable, but the at sea refueling was particularly important. Not only did it mean that the Cuban longliners did not have to leave the fishing grounds, but it meant that the FAC had access to subsidized Soviet fuel rather than having to buy it at international prices in hard currency. Beginning in the early 1990s the

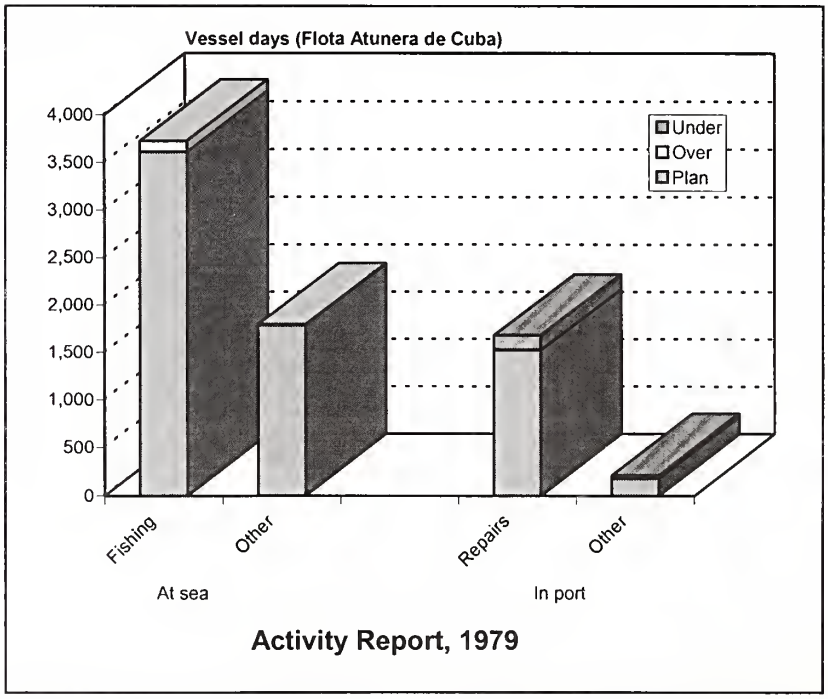


Figure 42.--Cuban publications constantly reported in the 1960s-80s that the longline tuna fleet was exceeding its plan. No mentioned was made that the fleet was losing large amounts of money annually.

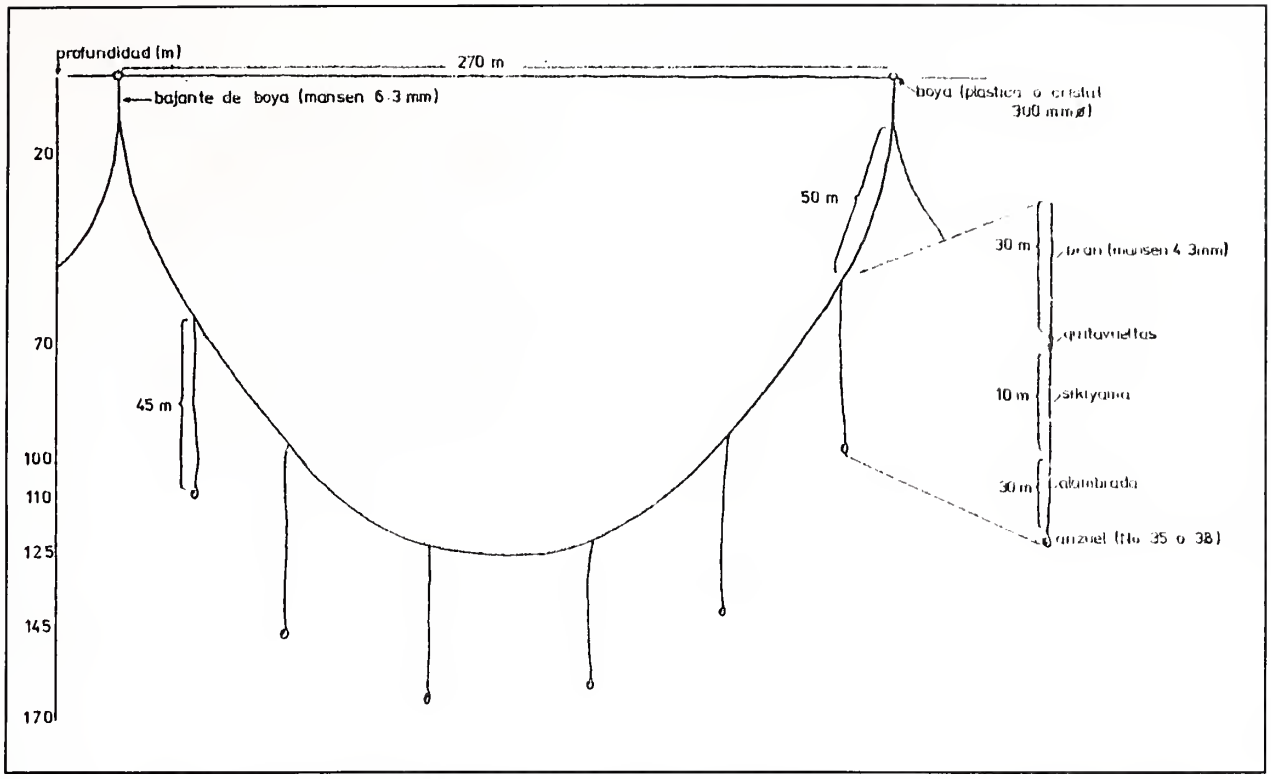


Figure 43.--FAC in their normal distant-water day time sets for yellowfin tuna normally set their hooks at 100-170 m deep. Rodríguez

FAC has presumably had to operate without the advantage of support from Soviet/Russian tankers.[625] Even without the Soviet tankers, however, a few Cuban longliners continued operating off West Africa through 1996 (appendix C1a2b).

d. Fishing methods

The Cuban longline fleet in the 1960s operated largely with Japanese fishing masters as well as Japanese master fishermen working as instructors.[626] Some of the Cuban longliners were acquired in Japan, but most were built in Spain (appendix A4a). Even with Spanish-built boats, the Cubans turned to the Japanese for fishing technology. Spain had a large longline fleet, but it was mostly medium-sized boats targeting swordfish. The Cubans had decided to follow the Japanese approach of larger vessels targeting tunas.[627] Thus Cuban fishing methods and gear were largely adopted from the Japanese.

Mainlines: One 1970s report indicated that Cuban longliners commonly deployed mainlines of about 80 kilometers. Some sources report that sets could be even longer.[628]

Hooks: Longline sets ("lances" or "palangrazos") could consist of more than 2,000 hooks. The hooks were reportedly placed 60-150 m apart, although the above figure suggests 45-50 meters. Hooks were normally set at depths of 100-170 meters.[629] Lightsticks were not employed.

Time: The Cubans reportedly set their lines in the morning at first light ("madrugada").[630] The fishermen began bringing the lines in about 12:00 noon and the retrieval could last until 12:00 midnight or even later. This daylight sets reflected the Cuban primary focus on yellowfin tuna.

Bait: The Cubans employed frozen bait. A researcher working with the fishermen in the 1980s reports that the primary bait he noted during the 1980s was Pacific saury ("sama") which was imported from Japan and the Soviet Union.[631]

Cuban captains tended to adjust operations to lunar phases. CIP researchers had done some work on swordfish behavior, including response to lunar cycles. (See: "II. Species B. Behavior".) Vessel operations, however, were conducted more by the captain's general assessment that the results of the CIP research. One researcher reports that the Cuban captains tended to pay little attention to their research on the topic and were convinced that catches declined during full moons. Some would captains would even schedule port calls during full moon periods.[632]

A Cuban researcher who worked with the longline fleet reports that the Cuban fishing methods and gear for the distant-water longline operations were developed in the early 1960s, primarily to target yellowfin tuna. Surprisingly over the course of nearly three decades, they were never fundamentally altered.

Introduction: The methods were adopted in cooperation with mostly Japanese advisers which introduced the gear and methods in use on Japanese longliners at the time. These same methods were adopted for the fleet when the large order of Anchoa-class longliners were acquired in 1965-66. The adoption of Japanese gear in the 1960s was a reasonable step given the preeminence of Japanese longline techniques at the time.

Never altered: What is surprising , however, is that these same 1960s Japanese methods and gear were used without any substantial modification throughout the 1970s and 80s as the Cubans maintained their focus on yellowfin tuna.[633] Not only did the Cubans not adopt innovations from other countries, but they never adopted important changes in methods and fishing strategy developed by the Japanese.

Japanese innovation: The Japanese during the 1970s and 80s made substantial changes in gear and fishing strategy. Japanese operations shifted with market conditions and other species such as albacore and bigeye were targeted. On a smaller scale bluefin was given more attention.

Other foreign innovation: U.S. fishermen in the 1980s deployed longliners primarily for swordfish to produce more valuable fresh product. Taiwan fishermen in the 1970s followed the Japanese in targeting other species besides yellowfin and by the 1990s were working with both fresh and frozen product. U.S. and Spanish fishermen adopted monofilament line and began using lightsticks. None of these and other innovations were adopted by the Cuban fishermen.

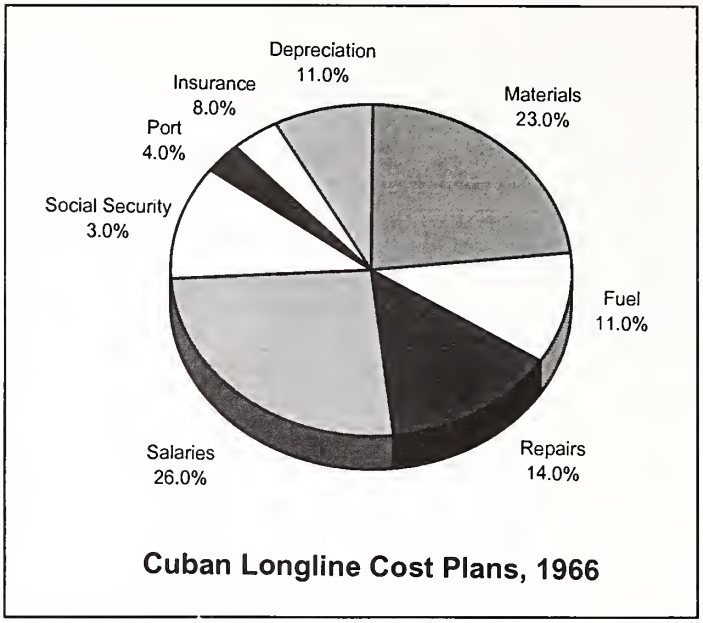


Figure 44.--Cuban planners in 1966 budgeted significant costs for salaries and other crew costs in the commercial tuna long-line fishery, but relatively little for fuel.

Assessment: It is unclear why Cuban fleet managers pursued their 1960s operating strategy and methods throughout the 1970s and 80s while so many productive innovations were being adopted by fishermen in other countries.[634] Curiously it was Cuban emigre fishermen in the Miami area that brought longline fishing experience with them to the United States and quickly adopted many innovations to help launch the U.S. longline swordfish fishery in the 1980s.

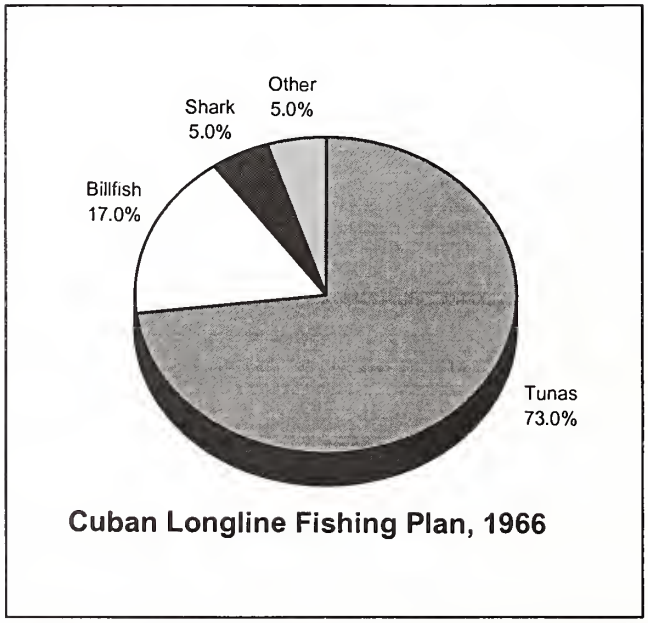


Figure 45.--Cuban officials in 1966 based their earnings estimates for the commercial longliners on catching mostly tuna and little low-value species like shark.

e. Crew and vessel deployment

Cuban longliners were operated for extended periods on distant-water grounds. Crews might work for 6-9 months at sea and than be exchanged through Las Palmas. The normal practice was to exchange crews every 100-120 sets.[635] The vessels themselves would tranship the catch at Las Palmas and to a lesser extent African ports. Supplies were delivered from Cuba or obtained in ports while transhipping. Fuel was obtained from Cuban or Soviet tankers. Some maintenance was contracted in Las Palmas, but to limit foreign currency costs as much work as possible was done in Cuban shipyards. Many longliners might not return to Cuba for several years.[636]

Cuban fleet managers in the 1960s initially deployed their longliners for 60-70 day trips. Such trips would yield 50-60 actual fishing days. As the Cuban personnel became better trained, vessels were

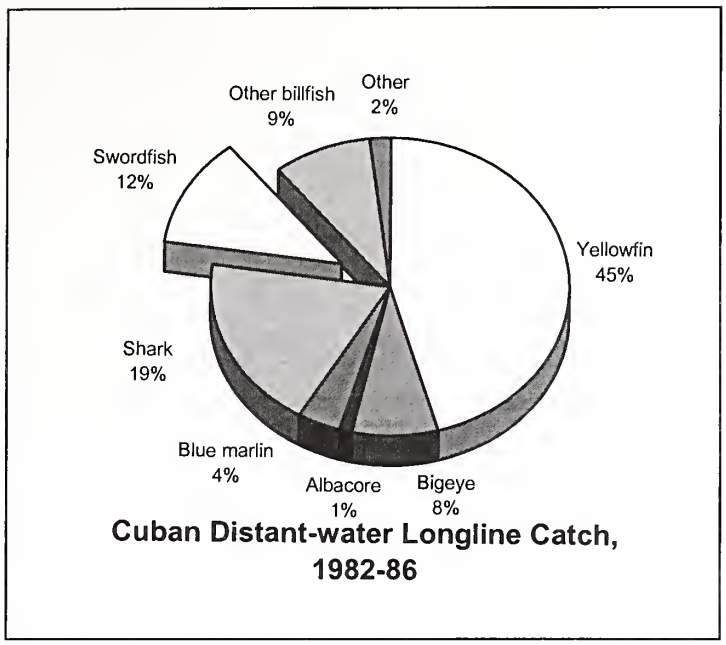


Figure 46.--Cuban longline catches in the 1980s included increasing numbers of low-value sharks. Bigeye catches declined and swordfish catches increased.

deployed for longer periods, up to 140-150 days. The Cuban vessels had an endurance of 90-105 days (appendix A4a). They could stay at sea beyond the endurance limit if supplied by support vessels. Cuban vessels in the early 1970s were reporting trips of 110-120 days with 85-90 actual fishing days or sets. Cuban officials in 1974 were reportedly trying to extend trips to 180-190 days or 130-140 actual fishing days.[637] One 1978 report indicated that a longliner made a 140-day trip and that on average the FAC longliners annually completed one trip and a half of a second trip.[638] This suggests that the FAC longliners were spending about 150-170 days in port annually. FAC vessels in the early 1980s averaged 140-day trips with about 100 sets.[639] Vessels in the late 1980s, however, were reporting trips with about 115 sets.[640]

f. Yields and productivity

The authors have not collected adequate data to properly access Cuban yields in the longline fishery. We have, however, noted some data. Cuban longliners reported about 1.8 t of fish per set during the 1990s.[641] FAC established a standard of about 1.8 t of fish per effective fishing day in the 1970s.[642] One record setting captain operating the *Mero* in 1989 reported harvesting about 2 t of fish per set, nearly half or 1 t of which was swordfish.[643] One assessment of the fishery indicates that FAC averaged about 20 fish per 1,000 hooks and that yield was relatively constant from 1973-85. The species composition, however could vary considerably.[644]

Cuban fleet planners initially conceived of a commercial longline fishery targeting tunas--primarily yellowfin. Initial plans conceived of nearly 75 percent of the catch as tuna and the income projections were based on that estimate (appendices A10a-b). Actual production, however, was quite different with much less high-value tuna being caught and much more low-value shark. In addition, Cuba fishermen never achieved planned production goals (appendix A9). As a result, the tuna longline fleet, from the beginning, ran substantial, but never revealed, deficits. This situation only worsened in the 1980s as maintenance costs escalated, yellowfin yields declined, and the Soviets failed to meet commitments of fuel deliveries.

g. Chronological trends

The authors do not complete details on Cuban fleet operations. An analysis of catch data, however, offers some insights into fleet operations. Catches by the commercial longliners appear to have varied over time:

Late 1960s: Cuban fishermen optimistically received the new Spanish-built longliners in 1967-68. One press report indicated, "... combined with those we already have will increase the well-deserved international prestige of our country in this area of endeavor ..."[645] Cuban longline catches from the beginning of their commercial fishery focused on tuna. Available data during this early phase of the fishery is sketchy. Tuna catches showed an increase to 3,300 t in 1976, reflecting the addition to the fleet of the new Anchoa-class longliners (appendix C9b). One would have expected catches to rise as the Cubans became gained experience in operating their new large longliners and became more familiar with the grounds on which the vessels were deployed. Curiously, catches declined to under 3,000 t in 1968 and 69, suggesting problems in fleet management. This is far below the level of production that would have been expected from the fleet that Cuba had acquired.[646] Swordfish catches during the 1960s were normally only about 200-400 t (appendix C8a). There were wide annual fluctuations which do not seem to reflect the fleet expansion undertaken during the 1960s, as the reported 270 t catch in 1969 was less than in 1960. A particularly good swordfish catch, however, of nearly 900 t had been reported in 1967. Cuban fishermen achieved very disappointing results with their tuna longliners.[647] In fact, results were so poor that contracts for additional longliners were canceled (appendix A4b).

1970s: Cuba began reporting significantly improved tuna catches in the 1970s (appendix C9b). Data for the

eastern Atlantic (FAO area 34) show the focus on tuna in their longline operations (appendix C7a).[648] The species composition varied from year to year. Yellowfin was not as dominant a part of the catch in the 1970s as it was in the 1980s. Available data suggests that large quantities of bigeye and other tunas were being landed, especially in the early 1970s (appendices C7a and C9b). Details on the accuracy of the species identification is unavailable. Cuba reported that tuna until the late 1980s was usually 60-80 percent of the catch (appendix C7a), except when unusual catches were reported, such as 1970 and 1977 when very substantial catches of jacks were reported (appendix C7a).[649] The authors are unsure how to interpret these statistics. It should be stressed that this is catch data and not actual fleet operations data. The authors have data collected by scientists which suggest that yellowfin was about 45 percent of the catch and tuna in general 63 percent of the catch, but this is in number of fish and for the period 1973-85 (appendix C4b2).[650] Even so, this tends to confirm the estimates from available data that tuna was about 60 percent of the catch (appendix C7a). One major factor involved here, for example, was the catch data appears to indicate only the sharks retained, not the actual shark hookings.[651] Extensive shark hookings can seriously impair fleet operations. A hook which a shark takes will not be available to take a valuable targeted species. The authors have used the tuna catch data more as a trend indicator than an indication of the precise catch composition. The tuna catch data reported by FAO in the eastern Atlantic during the 1970s and 80s was inflated by one tuna purse seiner which landed yellowfin and skipjack. ICCAT data for many years indicates the gear used and purseseine catches were usually about 400-700 t annually (appendix C9d). While the authors could not obtain detailed catch composition data to fully assess fleet trends, Cuban officials had earlier concluded that tuna longline operations were not profitable and by the 1970s were trying to diversify tuna operations by shifting to purseseining.[652] As the longliners were purchased in the 1960s, Cuba continued to operate them, although no additional longliners were ordered.

1980s: The Cubans in the early 1980s continued to report large tuna catches in the eastern Atlantic (appendix C7a). As mentioned above, this is catch data and not actual fleet catch composition data. The Cuban report cited above indicated that tuna was about 55 percent of the catch, mostly yellowfin (appendix C4b1).[653] Occasional references in Cuban publications also allude to composition data. For example, in 1987 about 24 percent of the catch was swordfish.[654] This appears to have been unusually high, about 12 percent was more common during the 1980s (appendix C4b1).[655] A sharply higher shark catch was reported in 1981 and for the rest of the 1980s, sharks were 20 percent or more of the Cuban catch. Unusually high swordfish catches were reported in 1983-85 and 1988-89. Overall catch levels began to decline after 1986, as did the proportion of tuna taken. This is of course a critical development as yellowfin was the target species. Declining proportions of yellowfin and increasing proportion of shark could only mean that the longline fishery was becoming increasing unprofitable. The overall Cuban longline catch dropped below 5,000 t in 1987. The decline of operations in the eastern Atlantic probably reflect reduced Soviet oil deliveries as well as rising costs of maintaining the aging Cuban longliners. It was at this time in 1998-99 that a MIP Comisión de Desarrollo concluded that additional investments in the longline fleet were not warranted. Longliners requiring major engine overhauls or other costly work were to be taken out of service.[656]

1990s: Cuban catches in the eastern Atlantic in the 1990s were maintained at 2,100-3,000 t until terminated after 1996-97 (appendix C7a). Sharks dominated the fishery. A particularly large swordfish catch was reported in 1995. Tuna were still taken, but did not dominate the fishery as was the case during the 1970s and 80s. It is unclear to the authors as to why operations were changed to land increasing quantities of sharks, a species which has less export value than the tunas that the FAC had previously targeted. This appears, however, to have been a not uncommon strategy for the Cuban fishermen. The captain contracted to fish for a Bermuda company in 1998 appears to have sought to maximize the quantity taken, regardless of the instructions of the company chartering his vessel. He landed large quantities of shark that the Bermuda chartering company did not want and could not sell.[657]

h. Products

FAC like most longline fleets produced whole tuna and headed and gutted swordfish and billfish. The Cuban fishermen like other fishermen were primarily after the meaty areas of the fish. The Cubans after gutting fish saved the head and eggs. These products were generally discarded by other fishermen. Shark fins were another important product from the sharks taken along with swordfish.[658] Fishermen from other countries generally took the fins, which are quite valuable, as part of their compensation. After each trip the shark fins were sold and the earnings divided among the crew. The authors are unsure as to what the practice was on a Cuban longliner. Given the large quantity of sharks reported beginning in 1981 (appendix C7a), earnings from the fins alone would have been substantial. All exporting is the exclusive

responsibility of state agencies like ACEPEX or CARIBEX. CARIBEX, for example, lists shark fins among their export products.[659] The authors have noted no mention of special compensation to the fishermen for the shark fins in Cuban fishery publications as is customary in most other countries.

i. Profitability

One unanswered question concerning the distant-water longline operations is why the Cuban fleet, despite the considerable investment, did not achieve profitable operations. This is particularly puzzling because the Cubans had access to subsidized Soviet fuel and paid relatively low wages and was capable of catching species with considerable market value. Both fuel and salaries are major factors in the calculation of fleet operating costs. A variety of factors undoubtedly were involved in the Cuban failure to achieve profitable operations. Clearly the problem was not inherently with longlining because several other countries (Japan, Korea, Spain, Taiwan, the United States, and others) reported profitable operations. Without internal FAC data, which the MIP is understandingly unwilling to provide, it is impossible to determine just why the Cuban fleet was unable to achieve profitability. It is possible, however, to list some of the factors which the authors believe to have been involved. Some of these factors are interrelated such as the inherent nature of state fishing fleets and lack of innovation and maintenance problems. Certainly one of the key factors was the inability of the longline fleet to produce a high-quality product that could be sold for high prices on the Japanese market. In short, FAC's failure to achieve profitability appears to have been the result of opting for the most expensive form of operations (distantwater) and failing to produce a high-quality product that could justify those high-operating expenses.

Yellowfin stocks: Cuban sources suggest that the declining stocks of yellowfin were a significant factor in the problems that the Cubans encountered.[660] It is true that yellowfin in the Atlantic was under considerable pressure by both longline and purseseine fleets. This certainly may have affected yields. The Cubans were not the only country to be affected by the status f yellowfin stocks. Other countries reacted by adopting new improved fishing technologies and varying fishing strategy. Curiously Cuban fleet managers did not.

State fleet: The inherent nature of the state fishing companies may have been a factor. State fishing fleets are not known for their efficiency. There are few examples of state corporations, from any country, profitably operating fishing fleets. Commonly a private owner is going to take more care with the operation of a vessel and exercise better judgement concerning maintenance and other costs than the employees of a state corporation whose own personal assets are not as risk. We stress that we do not have data substantiating this in the case of FAC, but mention it as a possible factor.

Lack of innovation: The Cuban fishing strategy focusing on yellowfin as well as the gear and methods adopted in the mid-1960s were used throughout the 1970s and 80s with virtually no significant modification.[661] This was a time in which other fleets were improving or adjusting strategies and adopting innovative gear and methods. No national commercial fleet composed of private fishermen and companies operated unprofitably for 20-30 years without significantly modifying operations. Cuban sources report that vessel captains were interested in innovations. It is not clear to the authors why innovations were not attempted in the 1970s, but by the 1980s the increasingly aging vessels were considered to be too old to operate and medium and higher latitudes.[662] Fluctuations in species composition may reflect some attempts to improve results. The gear used and basic fishing strategy, however, did not change.

Vessel purchases: The decision to purchase a large number of costly new vessels seems to have been a mistake. In particular Cuban authorities did not first achieve profitable operations with the mostly used longliners acquired in the early 1960s before placing a massive order in Spain during 1965-66 for an entire fleet of costly new longliners. Apparently Cuban authorities assumed that new vessels would solve the problems encountered in the early longline operations.

Vessel rotation: Some Asian longline fleets pursue a vessel rotational strategy. The Japanese do purchase new vessels, but companies in Korea and Taiwan often purchase used vessels and operate then for 10-15 years. This significantly lowers the investment in the fishery. This may well have been a more prudent approach for the Cubans. Cuban researchers working in the fishery are not sure why officials decided on the most expensive alternative of acquiring vessels.[663] It suggests, however, that profitability was not a high priority in the Cuban decision process in the mid-1960s when the vessels were purchased.

Vessel maintenance: Vessel maintenance appears to have been an ongoing problem with the Cuban fleet. Cuba never achieved profitability when its longliners were new. After 1965-66 no additional large longliners were added to the feet. Fishing vessels after about 15 years can become more expensive to operate. Thus in the 1980s maintenance costs must have been substantial. This is in part confirmed by the increasing references to maintenance that begins to appear in Cuban publications.[664]

Fishing strategy: Cuban fleet managers contracted Japanese fishing masters and technicians to train their longline fishermen. Much of this occurred in the 1960s, although many Japanese masters continued working on Cuban longliners in the 1970s. The gear and strategy acquired in the 1960s was never significantly modified. Japanese and other longline fishermen on their own vessels did make substantial changes in fleet operations in the 1970s and 80s, both technical innovations as well as strategies to adjust to market opportunities. The Cubans, however, never made such adjustments. The Cubans continued targeting primarily yellowfin tuna with the same gear and methods that the Japanese introduced in the 1960s.[665] This must have affected productivity in comparison to other longline operations.

Productivity: Cuban longliners never achieved the anticipated level of productivity which was based on Japanese operations. The authors are not sure why this was. Certainly one factor is that the Cuban fishermen did not have the level of technical support enjoyed by Japanese fishermen. The disappointing productivity became even more serious in the 1980s when the proportion of the targeted yellowfin began to decline. At first swordfish catches compensated, but by 1986 the combined totals of yellowfin and swordfish had fallen below 50 percent (appendix C8e). This must have affected earnings.

Marketing: Little information published information is available on the marketing of the Cuban longline catch. We know at times that the swordfish catch was sold both in the EU (primarily Spain) and Japan. (See "XII. Markets".) More interesting is that Cuban exporters did not market much of the FAC's principal catch (tuna) in Japan. This is curious because Japan was the world's primer market for tuna. The Cubans had the marketing capability to enter the Japanese market and were in fact exporting some swordfish and billfish as well as shellfish and other products to Japan. The fact that an important distant-water longline operation would not focus on the lucrative Japanese market is telling in itself. The key factor appears to have been the quality standards of the Cuban longline fleet and their inability to meet Japanese standards. The Japanese offered very good prices for high-quality tuna maintained at ultra-low temperature. As this market for high-quality tuna opened in the 1970s, however, the Cubans were unable to take advantage of it. Their fleet of Spanish-built longliners did not have freezing equipment that would have allowed them to freeze at the ultra-low temperatures the Japanese wanted. FAC studied the situation in the 1970s, but concluded that it would be too costly to install new refrigeration equipment in their longliners.[666] This corroborated by the poor prices the Cubans received for the small quantity of tuna which they did market in Japan. The limited quantities of both swordfish and tuna sold in Japan was generally sold at lower prices than those other distant-water operations were receiving (appendices E4b-c). In fact, there is some indication that Brazil, a country with a more coastal longlining fishery was receiving higher prices for tuna than Cuba (appendix E4c). The Brazilian fleet used much smaller less expensive vessels which mean they had a much lower cost structure. The more coastal Brazilian operations also meant lower operating costs.[667] Longlining is best suited for producing relatively small quantities of high quality product. The Cuban commercial fleet produced frozen product. A distant-water operation, given the high operating costs, needs to produce high-quality product that can be sold in the coveted Japanese market. This was especially important for the Cubans as they did not have access to the U.S. fisheries market. Also the Cubans never adjusted their operations to target bigeye, a species particularly prized by the Japanese and which commands especially high prices. Not only does available Japanese import data support this contention (appendix E4c), but Cuban officials constantly made statements on longlining that stressed production levels--suggesting that fleet managers were focused primarily on the quantity of tuna produced rather than product quality. Officials on several occasions state that they concluded that purseseine operations were more

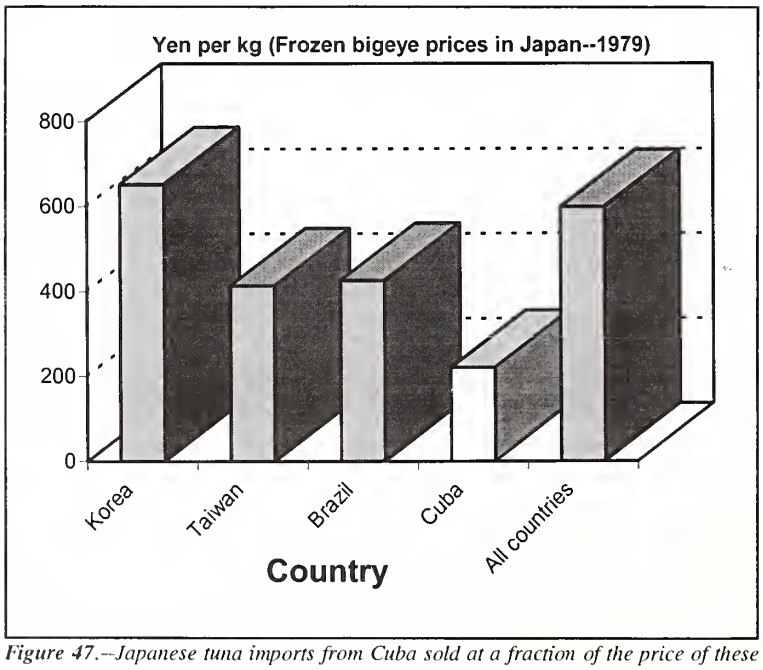


Figure 47.--Japanese tuna imports from Cuba sold at a fraction of the price of these of many other countries with longline operations.

productive than longlining.[668] Of course, they were correct in quantitative terms, but longline fisheries are able to produce a better quality with potentially high market value. The Cubans were apparently never able to fully capitalize on the market potential of their longline operations. Another factor of course was the Cuban decision to maintain the focus on yellowfin rather than bigeye which could command especially high prices in Japan if a quality product could have been supplied.

3. Operations off Cuba

The Cuban commercial tuna fishery was primarily conducted in distant-water grounds off Africa and in the central Atlantic. There has, however, also been some longlining off Cuba itself. The fishery has been conducted with both medium-size longliners and a seiner.

Longliners: Two types of longliners deployed longlines of from 1,500-2,400 hooks targeting yellowfin tuna. About 10 longliners until about 1980 operated incidentally in the Cuban EEZ on the way back and forth from grounds in the eastern central Atlantic. FAC in 1981 began to give more attention to operations in the EEZ.[669] By the mid-1980s, FAC was working grounds in Cuban waters more intensely. There were 13 FAC medium longliners about 25 m long working grounds around Cuba or near Cuba in 1984 (appendix A1). Press reports indicated that the medium longliners targeted tuna. Plans were for 5.35 work periods of 45 days annually, or 30 days of fishing and 15 days in port. Consideration was given to using helicopters to locate tuna schools.[670] We do not know if this was actually carried out. Despite the optimistic initial reports, the fishery was sharply curtailed in 1985 and suspended in 1986. Initially the vessels were deployed south of Cuba, but later were active in the Gulf of Mexico. The Cubans seem to have found the grounds near the Yucatan Channel particularly productive.[671] The lines were set from 4:00-6:00 am and the retrieval began about 12:00 noon, sometimes taking over 12 hours. Catches in the mid-1980s totaled around 700 tons. Yellowfin in 1981-86 was nearly 65 percent of the catch. There were also important catches of blue marlin.[672]

Seiners: Cuba has conducted various trials with purseseines in coastal waters. A Lamda-class vessel was rigged for purse seining in 1965. The *Jagua* was used in 1971. A shrimp trawler was rigged for seining in 1981. None of these efforts proved successful. Cuban researchers speculate as to the cause of the poor results. Some of the possible reasons include: unsuitable vessels, clarity of the water, and seasonal variations. Some suggest that FADs could improve results.[673]

C. Recreational

Cuba used to be a popular center for big game sport fishing. The American writer Earnest Hemingway helped to publicize Cuban big game fishing. He described sport fishing for marlin, sailfish, mako sharks, dorado (dolphin), wahoo, and several other species. The development of the recreational fishery was impeded by World War II restrictions which were kept in place after the war. Writing in 1949 he indicated that only one charter boat was available out of Havana.[674] A report in 1952 described facilities such as hotels on the northern coast, but none along the southern coast. Charter boats were available in Havana and Batabano.[675] Considerable expansion occurred in the 1950s. Cuban recreational fishing was eventually conducted from Havana, Cienfuegos, Santiago de Cuba, Sagua la Grande, and Cardenas. These were the ports that had marinas where most yachts and other pleasure craft were located.[676]

Castro's decision to impose a Communist police state and the subsequent U.S. embargo, however, effectively cut Cuba off from foreign anglers, many of whom were Americans. Fidel Castro himself sharply criticized tourism in his lengthy, impassioned televised discourses to the nation. Domestic policies were adopted which discouraged tourism. The tourism industry came to be seen as frivolous and inappropriate

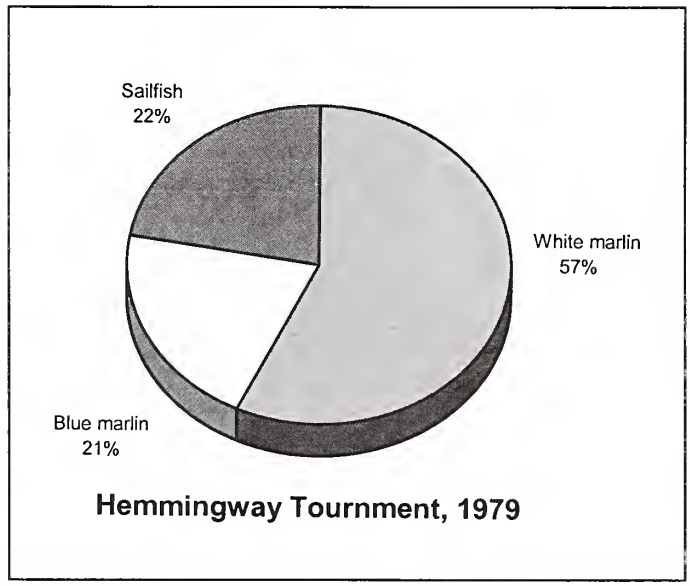


Figure 48.--Billfish abundance varies in Cuba, both seasonally and annually. White marlin were the primary species taken in the 1979 Hemingway Tournament.

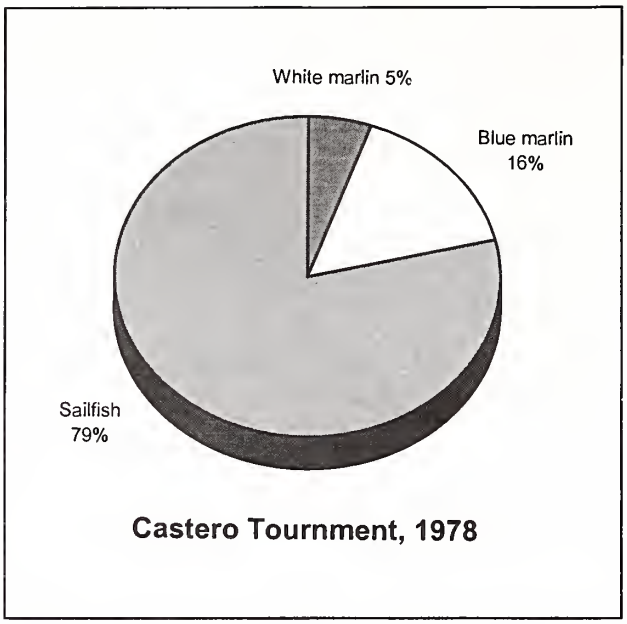


Figure 49.--Sailfish were the primary species in taken by anglers in the 1978 Castero (Blue Marlin) tournament.

for a revolutionary, egalitarian socialist society. Revolutionary officials saw foreign tourists as a corrupting, if not subversive influence. In part this was a reaction to the tourism of the 1950s which was seen as attracting mostly American tourists to Havana night life and prostitution. As a result, tourism was de-emphasized by the new Revolutionary Government and for many years investments in the tourist infrastructure were minimal. Tourists which did visit Cuba found conditions primitive and in some cases frightening.[677]

The Government continued to hold billfish tournaments, but the U.S. embargo discouraged U.S. participation and the industry did not flourish. Facilities for sport fishermen reflecting the neglected tourist infrastructure were limited. There are severe restrictions on private boat ownership in Cuba to ensure that individuals can not use boats to leave the island and to restrict individual movement as is characteristic of a communist country. The restrictions on boat ownership and generally low domestic income levels are other difficulties that impaired the development of a domestic sport fishery.

The Cuban attitude toward tourism has changed radically in the 1990s. Cuba's sun and surf are now recognized as valuable natural resources. Tourism has become the fastest growing sector of the Cuban economy. Many of the foreign investments in Cuba during the 1990s were projects associated with the tourist industry. Tourism has now even replaced sugar as the economy's principal source of foreign exchange earnings. One Cuba official stated that tourism is now "the heart of the economy." Cuba is attracting increasing numbers of Canadian, European, and Latin American tourists.[678]

The Government sees sport fishing as an element in the country's overall tourist industry. Sport fishing is a lucrative source of hard currency. The Government promotes sport fishing, but almost exclusively as an activity for foreign fishermen. Concessions have been given to foreign concerns to promote vacation packages in Europe and Canada for anglers.

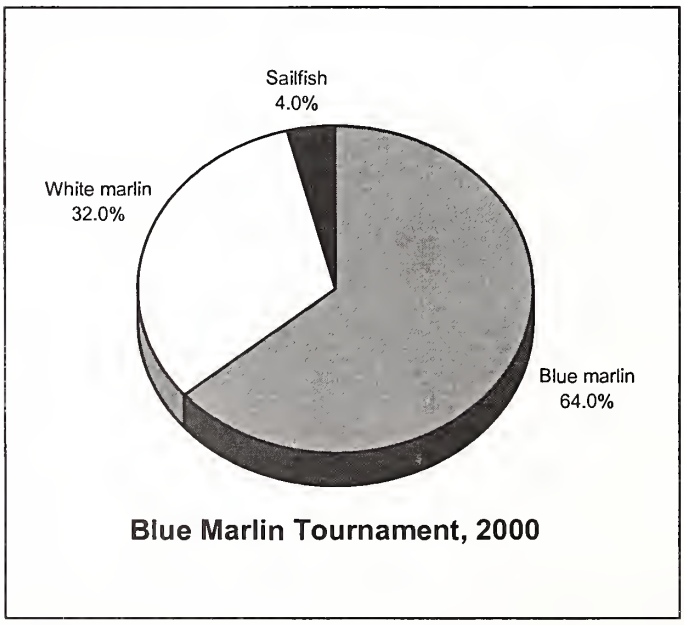


Figure 50.--Marlins, especially blue marlins, dominated the Blue Marlin Tournament in 2000. Anglers released 16 blue marlins.

Sport fishing for billfish and other big game fish appears to be primarily an activity to attract tourist dollars. Given the cost of such trips and the need to obtain fuel, sport fishing by Cubans appears to be relatively limited. There is, however, a Federación Cubana de Pesca Deportiva (FCPD) which was formed in 1976. Some Cubans do go sport fishing.[679] Just how extensive such domestic Cuban activity is unclear. The statutes creating the FCPD are similar to those of other similar national federations, with a few curious additions. Members have to be "... a faithful exponent of the sporting ethic and socialist morality."[680] Apparently visiting foreign tourists with dollars are excused from demonstrating "socialist morality". The authors believe domestic participation in big game fishing to be relatively limited, with most fishing done by tourists able to pay in dollars. Cuban fishing publications occasionally report on recreational fishing, but they rarely mention just who is doing the big game

Photo 31.--An Italian joint-venture partner manages and promotes a recreational fishing venture with a floating hotel. There are opportunities for both beach and boat fishing. Franco Fumolo

fishing.[681]

The authors have little current data on the results and catch composition at Cuban sport tournaments. Articles about the tournaments occasionally appeared in *Mar y Pesca* with some information about the Cuban tournaments. The MIP team enters teams in these tournaments. The largest fish taken in the Hemingway Tournament was a 112 kg blue marlin caught in 1977. There were 50 white marlin taken in a 1978 tournament, but only 5 in 1968. Anglers have caught 4 blue marlin in two tournaments, once in 1969 and again in 1985.[682] The appearance of billfish off Cuba can vary substantially from year to year. Thus tournaments which have to organized in advance may occasional occur at a time when few billfish are present.[683]

The CIP has not systematically collected data at Cuban sports fishing tournaments. A IO researcher (Dr. Guitart) did collect statistics, but the data was never published.[684] The CIP has published some catch composition data during the late 1970s (1978 and 79). The composition varied, but in most of the May tournaments white marlin was the predominant species (appendix C5a). Blue marlin predominated in the August tournaments.[685] Catch rates were highly varied, but seemed comparable to catch rates reported in U.S. tournaments.[686] Some information on the various Cuban tournaments is posted on the internet, but the authors could find little actual data compiled. Results for the 2000 Blue Marlin Tournament held during September showed mostly blue marlins were being taken (appendix C5b).[687]

Recreational fishing currently available in Cuba is primarily a coastal activity, in most cases promoted by foreigners. Relatively few Cuban internet sites advertise recreational fishing. Cuban state fishing companies have not set up sport fishing operations. Individual fishermen working through APPs are willing to take anglers fishing, but do not have access to computers and the internet so that they could advertise. Some of the sport fishing sites found on the internet include:

Jardines de Reina: About 80 km off the southern coast of Cuba are the Jardines de la Reina (literally "the Queen's Gardens"), an archipelago formed by hundreds of different-sized cays ("cayos"). The area is a idyllic setting of mangroves, "gin" clear water (as referred to in the promotional literature), palms and tropical plants that stretch out on white sand beaches. There are 240 km of "cayos," coral and sand flats, deep channels that crisscross the cays through which the fish can reach shallow water to hunt for food. There are many good places for diving, snorkeling, swimming and miles of secluded beaches. There is about 300 km of barrier reef. An Italian concessionaire in 1997 operated a floating hotel which is towed into pristine waters for the tourists. The Government in 1996 established a national park in about 1,400 square km of the Jardines de Reina. All commercial fishing, except strictly controlled lobster fishing, is prohibited. Heavy winds which often create difficulties for the saltwater anglers, is reportedly not a problem because of the many sheltered waters. A variety of species, primarily reeffish and other demersal species are abundant. Some of the primary species are bonefish, tarpons, barracuda, jack crevalle, cubera, red, grey and mutton snapper, a few snook. Other species include: jack horse-eye, cubera, jewfish, kingfish, wahoo, and amberjack. Sharks are reportedly very abundant. Trolling and bottom and shore fishing, are the techniques employed and feasible all year long.[688]

No Problem: One Jamaican fishermen planed a fishing trip off Cuba's southern coast in 2001.[689] This is a good example of a fishermen in Jamaica advertising on the internet while Cuban fishermen themselves do not.

Worldwide Holidays Direct: A British tourist company suggests that sport fishing for billfish is best during the spring and summer. They indicate that boats can be chartered at Cuban resorts, but that the least expensive approach is to work out an arrangement with local fishermen once the tourist has arrived in Cuba.[690]

Other: A few U.S. internet sites also promote Cuban

tournaments, although the names of the companies are somewhat difficult to decipher from the postings. These sites often include more discussion on the appropriateness of the U.S. trade embargo than information about Cuban sport fishing.

Cuba holds several billfish and other sport fishing tournaments, although some information is dated. The U.S. Government discourages participation in these tournaments, but some Americans do participate--either by travel through a third country or by simply sailing to the marina involved. This can be dangerous because of Cuban security concerns. U.S. anglers if they decide to participate in a Cuban tournament should notify the marina involved (VHF channel 16 or 7462 SSB) before entering Cuban waters.

Blue Marlin: The Blue Marlin International Tournament was initiated about 1982. It is sponsored by the Club Naútico International Hemingway. It began about 1982. The 15th annual event took place at Havana on October 14-19, 1996.[691] The 19th tournament was held September 11-16, 2000. There were 27 participating boats. Information on the tournament suggests that it is a catch and release tournament. Points are added for tagging. Results included 16 blue marlin, 8 while marlin, and 1 sailfish (appendix C5b).[692]

Cayo Largo Tournament: A British tour operator confirmed the existence of this tournament in 2000. The authors, however, have no details.[693]

Hemingway Billfish Tournament: One of the major Cuban tournaments is the annual Ernest Hemingway Billfish Tournament. It is held by the Club Naútico de Habana and is one of the longest running tournaments in the Caribbean. The tournament is usually held in May. The 49th tournament was held May 31-June 5, 1999.[694] American participants won the 1999 tournament. There were 55 participating boats from 5 countries.[695] The 50th tournament was held May 16-20, 2000.

Spring: The Torneo Internacional de Primavera (Spring) was also being held in May. A dated reference shows that the 1979 tournament was held May 27-30.[696] A British tour operator indicates that the Spring Tournament was still active in 2000.[697]

Marlin: The Concurso Internacional del Castero (marlin) was held August 9-12, 1970 and August 24-26, 1979.[698]

Wahoo: A new tournament is the International Wahoo Fishing Tournament. It is sponsored by the Club Naútico International Hemingway, which is more commonly called the Club Naútico de Habana. The 2nd tournament was held November 15-20, 1999.[699]

Inshore species: There are also tournaments for inshore species such as black bass. The Club Naútico de Habana on March 17-21, 1999, for example, sponsored the 2nd Open All Cubans Star of the Black Bass Fishing Tournament.[700]

Few details are readily available on the facilities and boats available for sport fishing. One Italian tour operator reports that swordfish are reportedly taken south of the Island as part of the commercial catch. There are, however, no sportboats equipped for big game fishing along the southern coast.[701] A British tour operator suggests that billfish can be taken out of Havana.[702] The best facilities are probably located there.

U.S. recreational fishing groups report that there appears to be increasing Cuban interest in sport fishing. Sport fishing groups have been promoting tag and releases fishing. Cuba tournament sponsors have contacted the U.S. Billfish Foundation to obtain tags. More Cubans are participating in the tournaments. The increasing number of Cubans with dollars may be one factor. More Americans also appear to be participating in the Cuban tournaments.[703] The CIP has not shown any interest in sport fishing. Through 1990 they had not collected data at sports tournaments.[704] This may have changed in the 1990s, but the authors have no current information suggesting this.

Cuban officials over the years have had difficulties dealing with recreational fishing. In a Cuba where food supplies are limited, there is more of a fishing for subsistence mentality than a recreational focus. The difference between the two is not always easy to discern. For years recreational fishermen were permitted to take small quantities for personal use, but not sell even a few fish. These restrictions have been relaxed somewhat.[705] Cuban authorities in late 1999 issued new recreational fishing regulations that were prepared by a government consulting commission. The new regulations require a license costing 100 pesos. Recreational fishing would be restricted to December to June (friday through sunday) and July-August (any day).[706]

Cuban researchers do not appear to have given any great attention to the recreational fisheries. One Cuban researcher, Dario Guitart-Manday, did collect tournament data. The CIP has not collected data from the tournaments.[707] The authors, however, know of no Cuban researchers currently working on tournament data, nor do we know of published papers analyzing such data. Presumably tournament results have been archived by the tournament organizers, but no information on this is currently available.

VII. Catch

The Cuban longline fleet has focused primarily on tuna, especially yellowfin. Longline catches increased substantially in the 1960s as large modern commercial longliners were acquired from foreign shipyards. There is a swordfish bycatch associated with the tuna longline fishery. Cuba has reported swordfish catches since the 1950s and in some years the catch has been sizeable. Interestingly, while Cuba had by the mid-1960s deployed its commercial longline fleet, swordfish catches were rather modest until the mid-1970s and did not peak until the 1980s--when the number of vessels had begun to significantly decline (appendix A4c). Cuba sources indicate that because of disappointing yellowfin yields that Cuban captains at this time began making more evening sets to target swordfish.[708]

Cuban officials organized a separate tuna fleet, the Flota Atunera de Cuba (FAC), during 1973-74. FAC operated Cuba's commercial longliners. The swordfish catch reached a record of almost 1,500 t in 1985 (appendix C8a). The catches have varied substantially from year to year. Beginning in the 1980s, the Cuban fleet reported substantial increases in shark catches, although the actual changes in the fishery are less clear. Yellowfin remained the principal target species, until the 1990s when shark became the target species as FAC began retiring its remaining longliners.[709] Tuna and swordfish catches could be exported for hard currency. Shark catches would be primarily used for domestic consumption, although some species could exported and the fins of all species could also be exported. Longline catches began to decline in the 1980s as vessels were idled because of fuel shortages. It also became increasingly difficult and costly to maintain the aging fleet. Many longliners were idled in the early 1990s. The small number of longliners that did continue to operating began targeting primarily sharks (appendix C7a). Cuba's fleet of longliners by the mid-1990s were mostly being scrapped. Even so the swordfish catch totaled nearly 900 t in 1995. The authors do not know why such a high swordfish catch was reported in 1995. Results in 1996 changed dramatically as the FAC was closed and significant distant-water operations off West Africa were ended. Since 1997 swordfish catches have been minimal, only about 9-10 t which was probably taken in the artisanal fishery operated in Cuban waters.

The authors have been unable to obtain detailed Cuban time-line data for this report. Often the data published by the Cubans is short term data carefully selected to demonstrate some positive development--despite overall long-term trends.[710] Instead we have used data published by ICCAT and FAO based upon Cuban submissions to them. We have used both data sets as the differing coverage and sorting of each set provide varying insights. There are, however, some statistical discrepancies between the ICCAT and FAO data, although efforts are underway to consolidate the two and considerable progress has been made in recent years.[711] The authors are providing both sets as it is often not clear which is the more accurate. As ICCAT focuses on a relatively small number of species, they have been able to devote more attention in developing statistical data bases on those species.

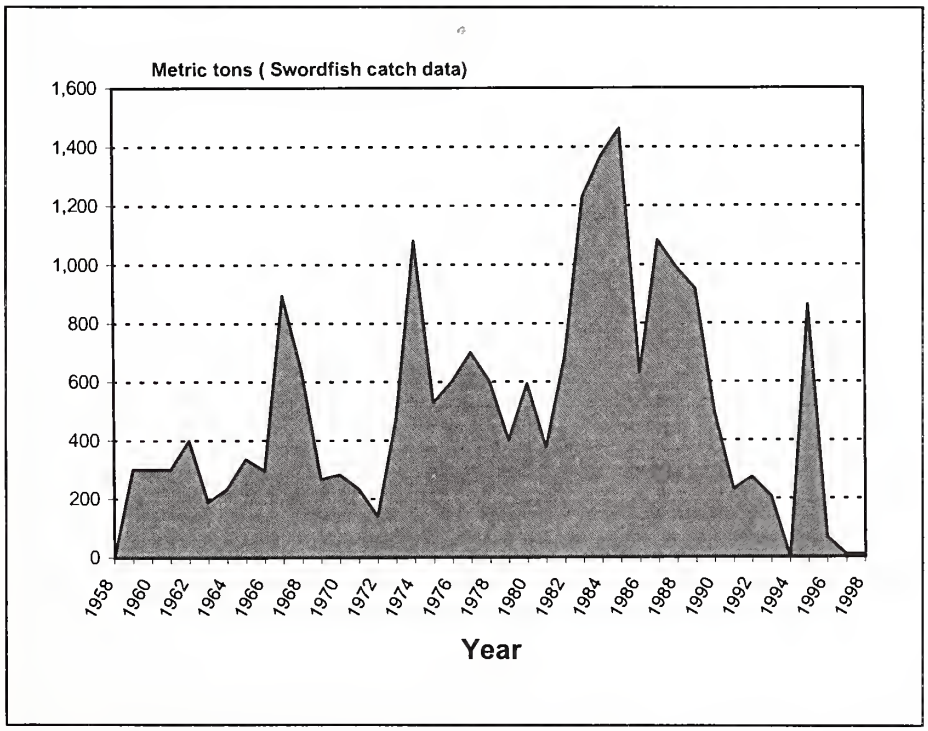


Figure 51.--Cuba deployed its commercial longline fleet during the 1960s. Swordfish catches, however, did not peak until the 1980s when the number of vessels had begun to decline.

The following information on Cuban swordfish catch trends is available for specific years. **Late 19th century**: Artisanal fishermen using

harpoons and lines have been taking small numbers of swordfish for years. The authors know of little published information on this, but it has been noted by the late 19th century, apparently based on Spanish fishing methods.[712]

1950s: While swordfish had been taken in Cuba for many years, actual statistical reports are not available until the 1950s. The first significant swordfish catch, however, was reported in 1959. The catch totaled 300 t (appendix C8a). This data appears to be only rough government estimates and the accuracy is questionable. The authors note that reported catch levels of 300-400 t during 1959-62 are higher than in 1963-64 and in subsequent years (1966 and 1969-73) after Cuban had acquired a substantial number of highseas longliners built in Japan and Spain (appendix A4a). It is known that a small longline fishery was conducted off the northwestern coast, so at least some of this catch was taken by artisanal fishermen.[713] ICCAT data reports Cuban catches in the Atlantic as early as 1959 (appendix C8f). The authors have no details or confirmation of a Cuban Atlantic fishery during the late 1950s.

1960s: Available catch data shows a varied pattern of tuna and swordfish catches during the 1960s. Swordfish catches approached 900 t in 1967, but subsequently declined to less than 300 t in 1969 (appendix C8a). These fluctuations in the swordfish catch are not well understood. A catch of less than 300 t when all of the large new Anchoa-class longliners were operating seems rather low.

1960: Revolutionary Government officials decided to expand Cuba's fishing industry. The CIP research plan was restructured in 1960 to support the planned expansion of the Cuban fishing industry. Data was obtained in Japan and Brazil and supplemented with U.S. data to determine the appropriate fishing grounds for a Cuban longline fleet. The Cuban focus was on yellowfin tuna.[714]

1961: The Government placed orders in Japan and Spain for commercial longliners. The first commercial longliner known to the authors arrived in 1961. ICCAT catch data (appendix C8f) suggests that there were longliners operating in the Atlantic as early as 1959, but this may be catches of vessels contracted from the Japanese.

1962: Cuba established the Flota Cubana de Pesca (FCP), the state highseas fishing fleet in 1962. Orders for commercial longliners were placed in Japan and Spain (appendix A4a). Some of these longliners began arriving before the year ended. The CIP prepared a detailed plan of operations for the fleet based primarily on Japanese fleet data, but including Brazilian and U.S. data as well. The plan focused on the wider-Caribbean and areas of Brazil, but showed some interest in the Gulf of Guinea as well.[715]

1963 FCP reported the first Gulf of Mexico and Caribbean catches in 1963. Vessels also were deployed off Brazil and north of the Bahamas.[716] Cuban captains reported "extra-ordinary" yields in the first year of operations. The fleet in 530 fishing days caught 2,100 t of fish or 3.9 t per day for each vessel.[717]

1964: Yields decreased in 1964 and only 1,300 t of fish were caught. The first Spanish-built longliner was deployed and reported a catch of 73 tons.[718] Orders for a much larger series of longliners, the Anchoa class, were finalized.

1965: FCP in 1965 began receiving the large Anchoa-class longliners ordered from Spain (appendix A4a), substantially increased the fleet's capabilities. The acquisition of 18 of these 705-GRT vessels made Cuba an important tuna fishing country. As a result, FCP expanded operations in the eastern Atlantic off western Africa during 1965--including grounds south of 0°S. One FAO report indicates steady catch increases during the 1960s.[719] Cuban sources report that yields declined during 1965 to only 2.5 t per day for each vessel.[720] The initial focus of the Cuban longliners

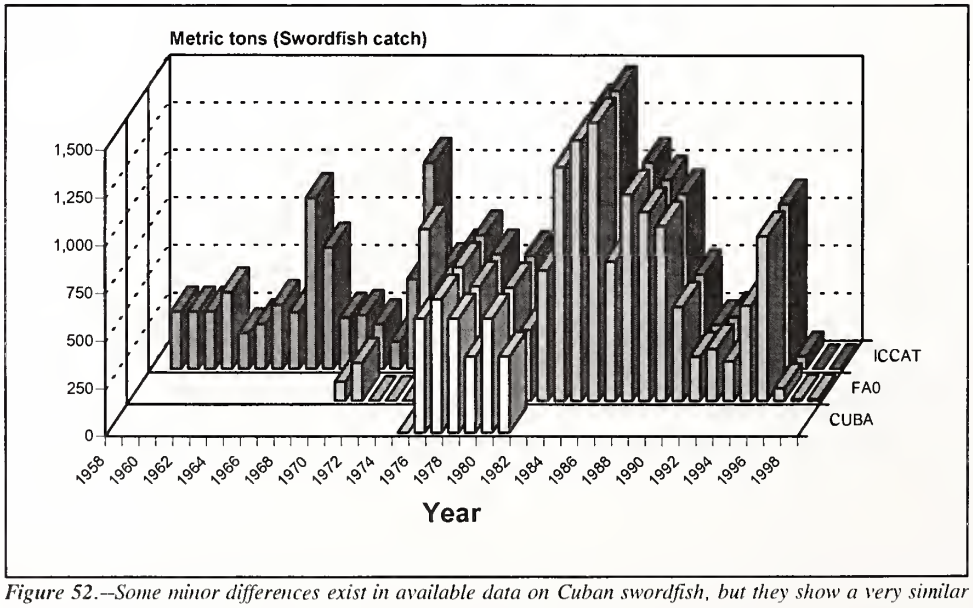


Figure 52.--Some minor differences exist in available data on Cuban swordfish, but they show a very similar pattern reflecting the rise and decline of the country's pelagic longline fishery.

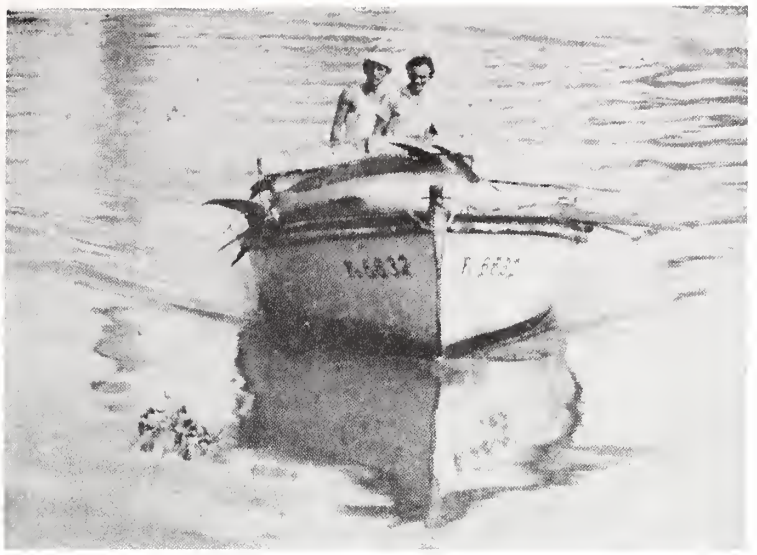


Photo 32.--The Cuban swordfish fishery in the early 1960s used small boats not much larger than the fish they caught. The fish was landed whole.

was tuna. Cuban sources report, for example, that the tuna fleet took 34,000 t of fish from 1965 to 1971, one-third was yellowfin.[721] Interpreting Cuban statistics, however, can be difficult. The author cited above, when alluding to 34,000 t of tuna, appears to be adding the bait-boat catch of less valuable tuna-like species to the yellowfin and bigeye taken by the longliners.

1966: The FAC reported that yields continued to decline in 1966.[722] This was at a time when FCP was taking possession of many new longliners. Inexperienced crews handling new vessels may have affected yields. Observers reported generally disappointing yields in the fishery (appendix A9). One FAO assessment indicated that "The value of production landed at actual sales prices would not cover the costs of production for any of the years planned" through 1970.[723] Cuban officials were hopeful, however, that with more experience and the arrival of the new Spanish-built Anchoa-class longliners that the fleet would report better results. Ambitious plans existed for significantly expanding Cuban longlining (appendix A6a).

1967: Cuba received many of its Anchoa-class longliners from Spain by 1967, giving the country a significant fishing potential. FAC reported that yields increased in 1967 to 3 t per day for each vessel. The tuna catch totaled 7,500 tons. The great bulk of the tuna catch, over 80 percent, was being taken by the FAC's Spanish longliners.[724] The primary fishing ground was the equatorial waters of the Atlantic (appendix C8d2a). Small catches of tuna (mostly yellowfin) and billfish were reported in the southeastern Atlantic (FAO area 41), presumably off Brazil, in 1967 and 1968.[725]

1968: Cuba had planned to order an additional 43 longliners in Spanish shipyards. Construction was planned to begin in 1969 (appendix A4b). The existing Cuban longliners, however, reported such disappointing results that plans for further expansion were postponed and eventually canceled.

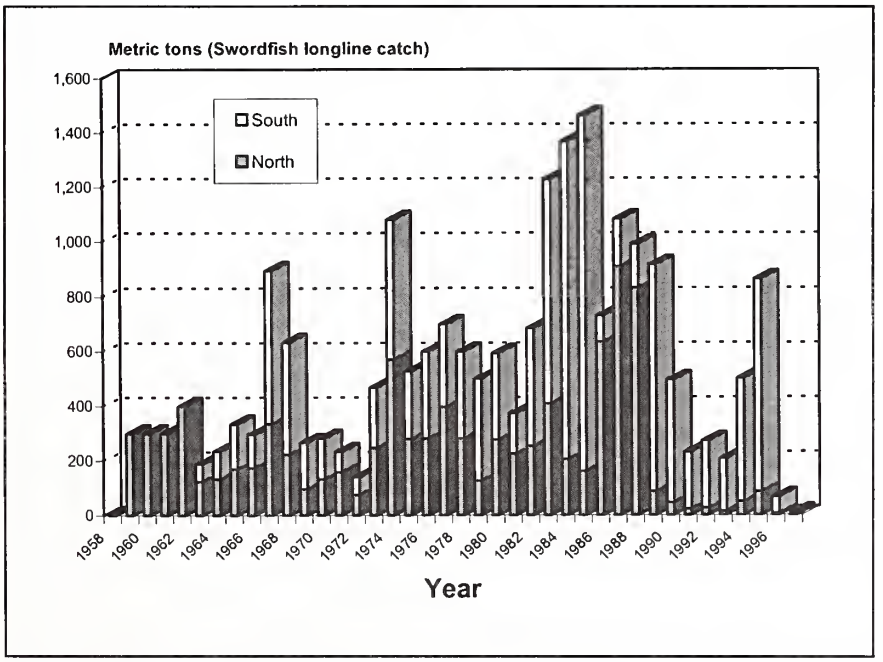


Figure 53.--Cuba according to ICCAT has operated in both the north and south Atlantic, but virtually all of the catch has been taken at equatorial latitudes. Catches in the 1960s were relatively limited.

1969: Cuba continued reporting swordfish catches in the south Atlantic, but the catch plummeted to only 267 t (appendix C8d2a). The authors do not know of any fleet developments to explain this drop. Cuban sources do not note any basic change in fishing strategy.

1970s: Cuban swordfish catches declined to only 140 t in the early 1970s, but increased sharply to nearly 1,100 t in 1974 with catches relatively evenly distributed between the north and south Atlantic (appendix C8d2a). The swordfish catch during the late 1970s fluctuated between 400-700 t, but the round numbers reported suggest

that the data was only rough estimates. Cuban fishermen may have been varying target species because the catch pattern for yellowfin, usually the target species, was different (appendix C8f). The FAC in the 1970s continued to focus on tunas, especially yellowfin and bigeye, and swordfish was a relatively small part of the total (appendix C9b). Reported shark catches were extremely low.

1970: Cuba opened a base port on the Canary Islands in 1970 to support the longliners operating there. An usually large catch was reported in the eastern Atlantic during 1970. The 22,000 t was twice the normal catch in the area and included large quantities of jacks. It is unclear what fleet was taking this fish (appendix C7a). Usually the catch off West Africa is primarily fish landed by the longline fleet (appendix C1a2a). In the exceptional years when unusually large catches of species other than tunas, such as jacks are landed, FCP may have deployed trawlers for mid-water operations or conducted other operations.

1971: FCP in 1971 abruptly pulled out of Las Palmas because of developing diplomatic problems with the Spanish Government.[726] Cuban officials were concerned that their vessels were about to be seized by the Spanish.

1972: The FAC appears to have reduced operations in the eastern and central Atlantic. Catches fell by more than a third to 6,800 t (appendix C7a). The swordfish catch was only 141 t (appendix C8a). These catch declines may in part be due to the loss of Las Palmas as a base port.

1973: Cuban officials separated the FAC from FCP and it began operating as an independent fleet in 1973.[727] FAC reported a slight increase in overall yields. The 8,000 t goal was achieved on October 27. Overall yields totaled about 2.6 t per day for each vessel. Most tuna longliners were assigned a quota of 306 tons.[728] The swordfish catch nearly doubled to 269 t (appendix C8a). Diplomatic relations with the Spanish improved, allowing FCP and FAC to regain access to Las Palmas in 1973. Cuban longliners continued to report yields far below those initially anticipated (appendix A9). Cuban researchers reported that fishing effort in 1973-77, focusing primarily, on yellowfin fluctuated significantly from year to year in the two major fishing zones (figure 22), but was highest levels were reported in the central Atlantic zone.[729]

1974: The FAC reported a very large and unexplained billfish catch in the eastern Atlantic during 1974 (appendix C7a). They also reported a massive increase in the swordfish catch. The overall swordfish catch exceeded 1,000 t for the first time (appendix C8a). The authors have no information as to why the swordfish and billfish catches spiked in 1974. The swordfish data suggests that captains were making more nocturnal sets rather than day sets for tuna, but we are unsure why this occurred in 1974 and was not repeated. We do note, however, that after 1974, swordfish catches tended to be significantly higher than before 1974 and that these higher catches continued despite fleet reductions after 1985 (appendix A1). Swordfish catches did not fall below pre-1974 levels until FAC began closing down its operations in the 1990s.

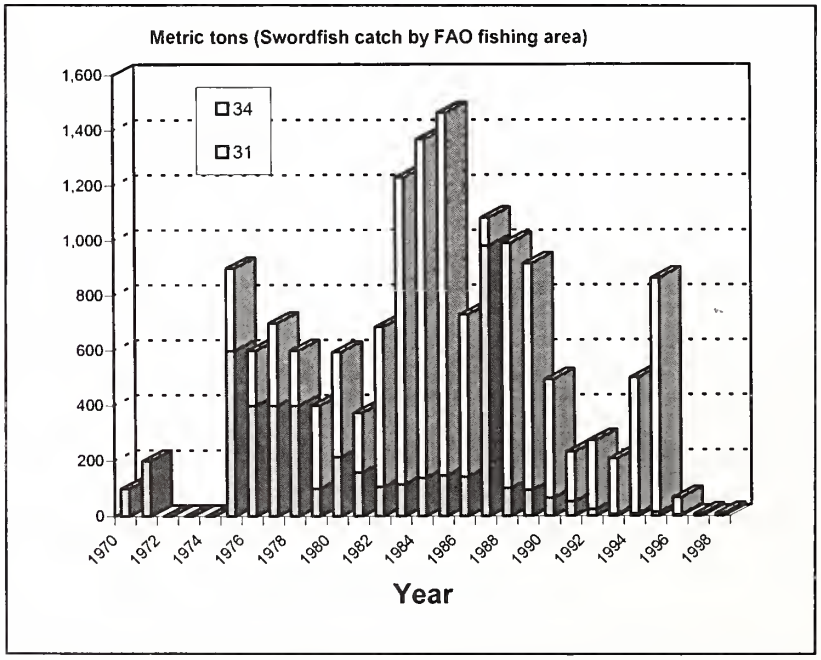


Figure 54.--Cuban swordfish catches in the 1970s according to FAO were largely taken in the central zone of the western Atlantic (FAO area 31), but in the 1980s shifted to the eastern Atlantic (FAO area 34).

1975: Cuban catches in the eastern Atlantic declined to only 6,600 t in 1975 (appendix C7a). The overall swordfish catch dropped sharply to only 528 t (appendix C8a). The FAC continued to deploy its longliners primarily for tuna, mostly yellowfin and bigeye.

1976: Cuba began reporting rough estimates of the swordfish catch in 1976 and continued doing so until 1980. The authors are unsure as to why they began reporting estimates, but there may have been non-fishery reasons.[730] Cuban sources report that the quality of fishery statistics varied greatly between 1960-90, primarily because of varying resources devoted to the statistical program.[731]? The rough estimates for 1976-80 may have been just a period in which data collection was given less priority. The estimated

swordfish catch reported was 600 t in 1976 (appendix C8a).

1977: FAC officials indicated that they exceeded their 1977 overall plan quota and that the plan quota for yellowfin was exceeded by 20 percent.[732] Fishermen reported another unusually large catch in the central eastern Atlantic, again exceeding 20,000 t (appendix C7a). A large part of that large catch was jacks. Jacks are not taken in quantity by longliners. As the tuna and swordfish catches were little changed, this catch does not seem to have been landed by the FAC longliners. It may have been taken by trawlers conducting mid-water operations or other vessels. The Cubans estimated the swordfish catch at 700 t in 1977 (appendix C8a).

1978: FAC officials reported a total catch of 6,710 t in 1987, sightly exceeding the plan quota of 6,600 tons. About 85 percent was tunas. Fishermen reported good tuna catches during much of the year, but catch rates began to decline later in the year.[733] The estimated swordfish catch was 600 t (appendix C8a). CARIBEX officials reported that Cuban officials had concluded that tuna longlining operations were not profitable and had decide to pursue purseseining.[734] Vessel captains in the mid-1970 began to report problems with equipment affecting the number of at sea fishing days. FAC began to train crews to make at sea repairs to prevent equipment breakdowns from impairing vessel operations (appendix A6b).[735] Cuban media reports were full of optimistic assessments of the fishing industry explaining how fishing vessels were being more efficiently serviced and repaired and how FAC crews were producing export earnings from "voluntary" labor and repairing their own vessels.[736] Such articles, however, suggest that FAC was experiencing problems with disappointing returns and rising maintenance costs.[737] MIP officials in 1978 expressed an interest in modernizing the coastal baitboat fishery for skipjack.[738]

1979: Press reports during 1979, as in most years, indicated that production was well above the plan for the year. The Cuban media provided many accounts of outstanding achievements.[739] The FAC in mid-November reported catching its annual quota goal of 6,600 tons.[740] The final year results exceeded the plan by 14 percent.[741] The FAC attempting to improve operations. Officials reported unspecified efficiencies such as increasing the average effective fishing days per vessel to 105 days.[742] The FAC reportedly received awards in the National Trade Union of Merchant Marine, Ports, and Fishing Workers "Al Rojo Vivo" competitions between state fleets.[743] The FAC reported 487 outstanding catches, double the norm. The FAC longliners receive awards if they achieve catches above 2.2 t per trip. FAC set the standard as 1.7 tons per trip.[744] Reading these press reports one would think that FAC was a highly profitable operation. In fact, FAC accumulated substantial annual deficits which were not reported in the Cuban media. The estimated swordfish catch was only 400 t (appendix C8a). Artisanal longline fishermen operating off Cuba's northwestern coast reported very low billfish catches, only a fraction of the level reported throughout the 1970s (appendix B1a4).[745]

1980: Cuba's catch of tuna and tuna-like species totaled 11,900 t in 1980, nearly half of which was yellowfin (appendix C2a1). This was well above the plan quota which was achieved by September. The incidental swordfish catch was only 600 t, about 5 percent of the total. Exploratory longline fishing was begun in Cuban waters for tuna and tuna-like fish using converted French-built shrimp trawlers.[746] Cuban distant-water operations were disrupted in July 1980 when unmarked Moroccan Air Force planes attacked FAC tankers about 50 km off the Western Sahara (former Spanish Sahara). The captain of one ship was killed and three crewmen injured.[747] Cuban officials resumed reporting precise catch data in 1980. Cuba also reported a record yellowfin catch of 5,817 t (appendix C9c2). The 1980 swordfish catch was 594 t, taken over widely dispersed areas of the equatorial Atlantic--especially in the eastern Atlantic (appendices C8d1 and C8d2a). Even so, Cuban researchers reported a much greater abundance of swordfish in the western Atlantic than eastern Atlantic. Researchers also reported increasing difficulties obtaining funds for distant-water research beginning about 1980.[748]

1981: The FAC reported that 1981 was a difficult year. The swordfish catch fell in 1981 to only 374 t (appendix C8d2a). The yellowfin catch also declined to only 4,942 t, but was still well above the average (appendix C9c2). FAC only deployed 13 vessels as problems were encountered with the increasingly aging flee, much of the fleet consisted of vessels about 15 years old. The fleet operating reported improving catches, about 1.9 t of fish daily.[749] The FAC appears to have made some major decisions in 1981, significantly shifting fishing strategy. The FAC reported its first large shark catch from the central eastern Atlantic in 1981. The FAC took 1,900 t of shark in 1981, but previously shark catches in the area had not exceeded 600 t (appendix C7a). Cuban longline fishermen had reported substantial shark catches for some time (appendix C11a). The authors are not fully convinced that Cubans began taking substantially increased quantities of shark in the central eastern Atlantic at this time.[750] (See: "Bycatch".) Perhaps because of the poor catches, FAC attempted to find some more productive grounds. While the grounds off Africa and the central Atlantic (figure 41) continued to be the main area of operations, beginning

Photo 33.--Cuban commercial longline fishermen during the 1960s-80s focused primarily on yellowfin tuna.

in 1981 FAC began to give more attention to operations in the Cuban EEZ. Until 1981 there had been only occasional sets in the EEZ, usually opportunistic sets when a longliner was returning to Cuba from Atlantic operations. Beginning in 1981, FAC began deploying a few medium-sized longliners (appendix A1) which operated in Cuban waters or waters relatively close to Cuba.[751]

1982: Overall tuna catches fell in 1982. The swordfish catch, however, increased to nearly 700 t in 1982 (appendix C8d2a). Shark catches declined, but continued at high levels (appendix C11a).

1983: The overall tuna catch was little changed in 1983, but the swordfish catch exceeded 1,200 t (appendix C8d2a). The yellowfin tuna catch declined to only 2,700 t, the lowest level since 1975 (appendix C9c2). It is unclear why the swordfish catches increased, but it suggests that FAC captains may have been making more nocturnal sets.[752] The deployment of larger numbers of medium-sized longliners in or near Cuban waters (appendix A1) may have been another factor. The FAC shark catch in the central eastern Atlantic reached 2,100 t, an all time record (appendix C11b). The FAC longliners and the overall FAC performance during the 1970s had featured prominently in MIP end of the year awards. There was no mention of the FAC longliners, however, in the 1983 FAC awards and the best performing vessel in the FAC fleet was the single purse seiner--the *Jagua*.[753] The FAC reports exceeding the 1983 plan by 3 percent and the 1982 catch by 7 percent. FAC officials reported increasing difficulties obtaining spare parts, requiring vessel crews to be "inventive".[754]

1984: The overall tuna catch increased somewhat. Swordfish catches also increased and approached 1,400 t (appendix C8d2a). The artisanal fishermen operating off the northwestern coast reported slightly higher swordfish yields, but sharply falling billfish yields since 1981 (appendix B1a2).[755] These artisanal fishermen sharply reduced daytime effort in 1984.[756] The number of medium-longliners operating from Cuba increased to 13 (appendix A1). The overall Cuban catch in the eastern central Atlantic area again spiked in 1984 because of the deployment of trawlers, but this time did not reach 20,000 t (appendix C7a). This unusual catch consisted of large quantities of jack and horse mackerel, probably taken by the FCP trawlers in mid-water operations.

1985: The longline catch declined in 1985 as a result of the withdrawal of several longliners from the fleet. Not only were 4 distant-water commercial longliners withdrawn, but most of the medium-sized longliners operating closer to Cuba (appendix A1). The overall catch decline, however, was moderate as yields of yellowfin, the primary target species, improved. Swordfish catches also improved--to nearly 1,500 t, another record and reaching 17 percent of the longline catch (appendix C8d2a). This was the high point of the Cuban swordfish fishery. Swordfish constituted about 17 percent of the longline catch (appendix C8e). Almost all of the swordfish was taken in the south Atlantic, in contrast to the 1970s and early 80s when substantial catches were reported in both the north and south Atlantic (appendix C8d2a). While a substantial portion of the catch was reported in the south Atlantic, it was virtually all in the equatorial area north of 10°S. Press reports describing efforts to save foreign currency costs. FAC officials, for example, announced plans to reduce each vessel time in foreign ports by 20 days.[757] Such reports suggest the increasing concern with fleet mangers over such foreign currency costs. FAC was initially conceived as an important generator of foreign exchange earnings through exports.

1986: The swordfish catch dropped precipitously to only 730 t in 1986 or by half (appendix C8d2a). Yellowfin catches also declined, but not as precipitously (appendix C8e). The FAC reported a sharp decline of the shark in the central eastern Atlantic during 1986 and catches continued at low levels until 1990 (appendix C7a). Artisanal fishermen operating off the northwestern coast submitted data in 1984-86 (appendices B3a-b), indicating that the size of the swordfish caught had dropped significantly from that reported by researchers in 1964 (figure 16).[758]

1987: Swordfish fishermen reported another good catch of nearly 1,100 t, most of which was taken in the

western central Atlantic. This was, however, below the 1985 record. Longline catches of yellowfin, however, declined sharply. Fleet officials reported that the overall plan quota of 3,845 t of tuna and related species was achieved November 11. Although the Cuban media reported the tuna plan was filled, the important yellowfin catch continued at the lower 1986 levels. The catch had declined from 3,500 t in 1985 to only 2,400 t in 1987 (appendix C8e).[759] FAC reported an unusually large proportion of the catch was swordfish in 1987.[760] Notably, FAC began operating its longliners out of Cuban ports in 1987, instead of the Canary Islands because of the foreign currency costs on the islands.[761] While the impact was not immediate, there are notable differences between catch levels and species composition before and after this transition.[762] Small quantities of Atlantic bonito were reported in the southeastern Atlantic during 1987-90. The authors are unsure what vessels were deployed there to take this fish. Off Cuba, bonito is mostly taken with baitboats. As no large pelagics were taken there, this does not seem to have represented a deployment south of Cuba's commercial longliners.[763]

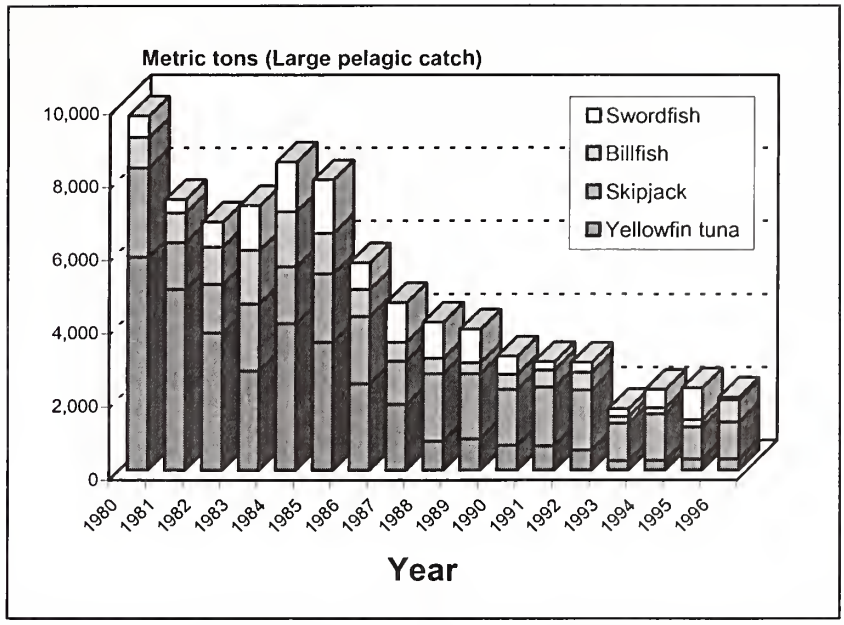


Figure 55.--Yellowfin tuna dominated Cuban pelagic catches until the late 1980s. Except for the skipjack, the species shown here were mostly caught by longlines.

1988: The FAC longline catch in the central eastern Atlantic fell below 5,000 t in 1985, the lowest level since the fishery was launched in the 1960s. Declining deliveries of Soviet oil and increasing maintenance problems with the aging fleet are probably the major reasons for the catch decline. The swordfish catch in the area was nearly 900 t, a decline from 1,100 t taken in 1987 (appendix C8d2a). The yellowfin catch also continued declining (appendix C8e).

1989: Cuba longliners averaged about 200 t of tuna per fishing trip. Press reports indicated that many Cuban longliners were idle in shipyards for repairs because of the ages of the vessels. Reports also indicated that few technological improvements have been made during recent years.[764] The FAC reported lower yellowfin catches in the eastern central Atlantic. The catch declined by more than half to only 800 t, and fell below 20 percent of the longline catch (appendix C8e). The yellowfin catch in 1986 had been 3,500 t and 5,800 in 1980. For the first time the shark catch exceeded the yellowfin catch (appendix C7a). The yellowfin catch has never since exceeded 1,000 tons. The reduced yellowfin catch not only reflects declining fishing effort but also changing fishing strategies away from tunas and toward sharks. It is unclear to the authors why

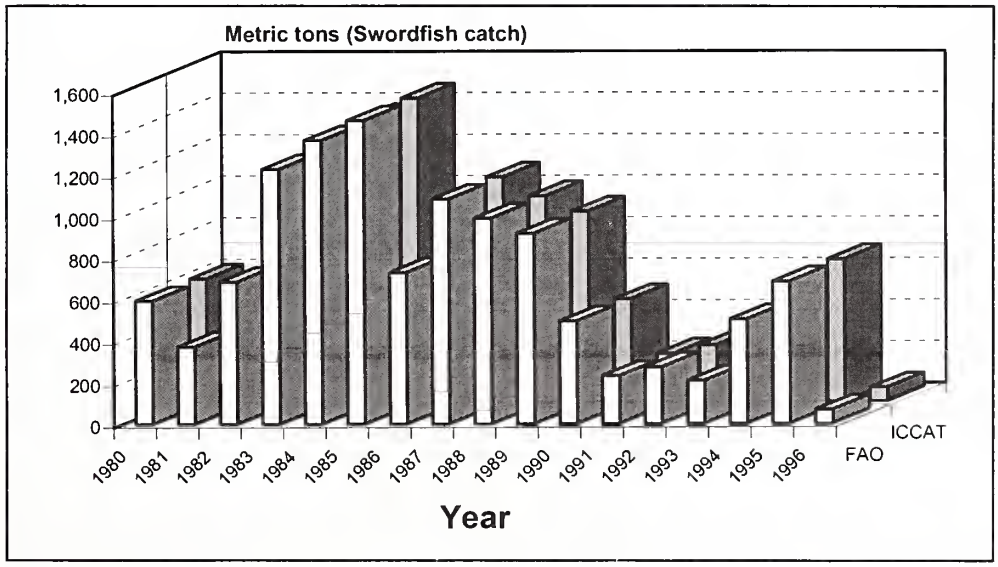


Figure 56.--The Cuban swordfish catches have been highly variable. The last significant catch was reported in 1995.

the Cubans shifted their fishing strategy. The shift represents a declining emphasis on export earnings and an increased emphasis on producing food supplies for the domestic market. Thus at a time when the Soviets were reducing oil deliveries and the aging longline fleet was becoming steadily more expensive to operate, the catch not only declined in quantity, but the value of the landings was further reduced because of the lower proportion of valuable yellowfin. It was at this time that the MIP Comisión de Desarrollo decided not to make further investments in the commercial longline fleet. The Comisión decided to continue operating serviceable longliners, but once any costly work like new engines were required that the vessels would be retired.[765]

1990: Cuban tuna and swordfish catches continued to decline during the 1990s. The breakup of the Soviet Union and the termination of the Soviet fuel subsidy radically affected the profitability of FAC operations, adversely affecting both fishing effort and catches. The swordfish catch dropped precipitously in 1990, totaling about 495 t--only about half of the 1989 catch (appendix C8d2a). The major fishing ground was the eastern central Atlantic off West Africa, but substantial amounts were taken in the south Atlantic (appendix C8d2b). The yellowfin longline catch increased slightly, but was still only a fraction of earlier levels (appendices C9c1-2). The small catch of Atlantic bonito was reported in the southeastern Atlantic during 1990, but not in subsequent years.[766] While catches of other species declined in the eastern central Atlantic, the FAC reported a very significantly increased shark catch (appendix C11b). The level of shark catches, over 40 percent in the Eastern Atlantic (appendix C7a), suggests that some Cuban captains may have begun targeting shark. (See: "XV. Bycatch".)

1991: FAC sharply curtailed the already limited longline operations. The swordfish catch declined to only 232 t and the yellowfin catch to only 676 in 1991. FAC's output was not only declining in quantity, but the proportion of the most valuable species continued declining. These two species, yellowfin and swordfish, which often accounted for over 50 percent of the longline catch in 1981 totaled less than 25 percent of the catch (appendix C8e). This must have had a major impact on FAC's profitability. Even the shark catch declined in 1991 to only 2,000 t, the lowest level since the 1960s (appendix C11b). The Soviet Union was dissolved at the end of 1991 and with it went Cuba's all important oil subsidy. While the Soviets had not been meeting their commitments for some time, it was not until the Soviet Union was dissolved that the subsidy was terminated.

1992: FAC maintained operations in 1992. Swordfish and yellowfin catches did not change significantly (appendix C8e). Shark catches actually increased, especially off West Africa (appendix C11b).

1993: The swordfish catch totaled only 208 t in 1993, the lowest level since 1963 (appendix C8d2a). Much of the decline took place in catches off West Africa, declines in the south Atlantic were not as sharp (appendix C8d2b). Catches of tunas taken in the longline fishery also declined significantly (appendix C6). ICCAT reported at the time that Cuban had virtually withdrawn from distant-water longline fisheries.[767] The FAC was, however, still operating a few longliners. Shark catches by those longliners in the eastern Atlantic exceeded 50 percent, more than twice the level reported in the 1980s (appendix C7a).

1994: FAC more than doubled swordfish catches in 1994 to over 500 t (appendix C8d2a). Curiously at the same time yellowfin catches fell by about the same amount that

Photo 34.--Cuban longline fishermen in the 1990s reported large shark catches and less tuna, although night sharks were less common. The fishing strategy appears to maximize the quantity taken.

swordfish catches had increased (appendix C9c2). Shark caches in the eastern central Atlantic increased (appendix C11b): Shark catches were now more than three times larger than swordfish and yellowfin catches combined.

1995: Little information is available on FAC operations during 1995, but the fleet still reportedly consisted of 10 longliners and three support vessels (appendix A3b). Not all of these vessels, however, appear to have been active in 1995. The FAC did report a strong 1995 swordfish catch of nearly 865 t, mostly in the eastern central Atlantic (appendix C8d2b). The authors have no information as to why such a large increase in the swordfish catch would have been reported in 1995. The important yellowfin catch, however, was not increased (appendix C9c2).

1996: The Cuban catch in the eastern Atlantic declined to only 2,100 t in 1996, the last year substantial catches were reported in the area (appendix C7a). Except for 1991, this was the smallest quantity in over two decades. Although a substantial swordfish catch was reported in 1995, only minimal catches of 67 t were reported in 1996. The shark catch also declined, but at 1,050 t was still nearly half the catch in the eastern Atlantic. The billfish catch increased to 575 t, the highest level in 10 years. Notably about three quarters of the Cuban catch in the central eastern Atlantic was either shark or billfish. This was a sharp contrast to the 1960s and 70s when yellowfin and bigeye were targeted and the 1980s when yellowfin and swordfish were targeted (appendix C7a). The reason for this shift in fishing strategy as explained above is not yet known. One would have thought that FAC faced with serious fuel and maintenance costs would have increasingly targeted species which could be sold on export markets for hard currency like tunas and swordfish. Just the opposite proved to be the case, FAC in its last year took mostly shark and billfish.

1997: Cuba's swordfish catch in 1997 declined to only 9 t (appendix C8a). Notably the small quantity was reported after the FAC was closed. This could thus only represent catches in Cuban coastal waters. Cuban sources have indicated that the artisanal fishermen continue to operate coastal longliners.[768] The authors note that the Cubans have modified their catch reports submitted to FAO for the 1999 *Yearbook of Fishery Statistics* and have reported a small yellowfin catch in the eastern central Atlantic during 1997 (appendix C7a). We are uncertain how to interpret this because no other species are reported. A longline operation that only takes yellowfin is unlikely. This was the last reported Cuban catches in the eastern central Atlantic.

1998: Cuba's swordfish catch in 1998 declined to only 10 t in 1998 (appendix C8a). Notably the small quantity was reported after the FAC was closed. This could represent only catches in Cuban coastal waters.

1999: Cuba reported a swordfish catch of only 5 t in 1999 (appendix C8a). Information on a joint venture with a Bermuda company suggests that Cuban fishermen seem to be interested in maximizing catches, even if the species is less valuable shark then in landing tuna and swordfish. (See: "XVI. International: Joint ventures".)

2000: The authors have no current information on Cuban swordfish catches. As the commercial longline fleet has been retired, Cuba no longer has the capacity of landing significant swordfish catches. As a result, the 2000 catches will presumably be similar to the small 1997-99 catches and reflect the catch of the artisanal fishery. In fact the swordfish catches reported are probably a good indicator of the status of the artisanal longline fishery.

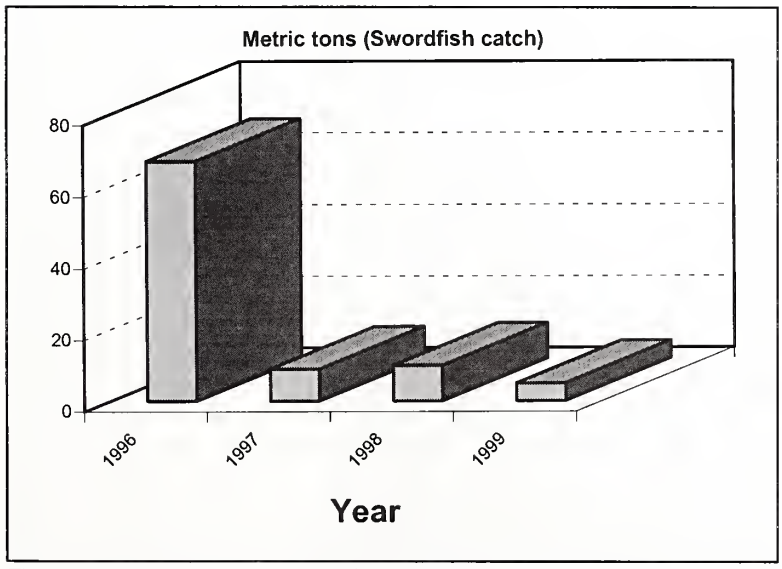


Figure 57.--Cuban swordfish catches since 1996 have been minimal. Most of the catch is believed to have been taken off the northwestern coast, but we have no current information on such operations.

VIII. Ports

Limited information is available on the ports used by the Cuban longline fleet, both Cuban and foreign. The two principal ports of the commercial longline fleet were La Luz on Las Palmas in the Canary Islands and Havana.

A. Individual ports

1. Foreign

The primary foreign port used by the Cuban longline fleet is Las Palmas in the Canary Islands, but some African ports were also used to a lesser extent. Facilities were not as good at the African ports, but port costs were not as expensive. In addition, the Cubans had cultivated friendly relations with many African countries which allowed the negotiation of advantageous access arrangements. The African port ports were useful in that, despite the limited port facilities, were close to actual Cuban fishing grounds.

Vigo (42°N): Vigo is the principal Atlantic coast Spanish fishing port. Much of the Cuban distant-water longline and trawler fleet was built in Vigo shipyards during the 1960s. Reports during the late 1970s indicate that major outfitting and repairs of these vessels were carried out in Vigo.[769]

Las Palmas (28°N): The Cuban tuna fleet extensively used the port of La Luz at Las Palmas in the Canary Islands. Las Palmas, like other Spanish ports, had been closed to fishing boats from communist countries since the late 1930s. The Director General of the Spanish Merchant Marine in 1967 initiated a new policy and authorized Las Palmas port authorities to service Soviet fishing vessels.[770] The motive of course were the lucrative fees involved. The Cubans had, in fact, already established good commercial relations with Spain when they began ordering vessels from Spanish shipyards (appendix A4a). Las Palmas thus became one of FAC's two base ports. Cuban longliners were first deployed in the eastern Atlantic off western Africa in 1965. FCP staff[771] in 1970 opened the base port at La Luz in Las Palmas on Gran Canary Island during 1970 to better support these distant-water operations. The Canaries were located north of the actual Cuban fishing grounds.[772] The excellent facilities and easy access to the Spanish and other European markets made the Canaries a useful base for the Cubans. In 1970 alone, Cuban fishing vessels made 120 calls at Las Palmas. Cuban fishing vessels, however, in 1971 were redirected from Las Palmas. FCP hastily ordered its longliners out of Las Palmas leaving behind gear and equipment, but took all shore based personnel. Trade negotiations with the Spanish were going badly and the Spanish were demanding compensation for the nationalized property of Spanish citizens, not to mention Spanish citizens being held as political prisoners. Perhaps most galling to the conservative Spanish was the activities of Cuban diplomats who openly distributed communist propaganda and supported left-wing political activities.[773] The Cubans were apparently concerned that the Spanish might seize their vessels. The Cubans and Spanish did not mend their relationship until 1973 at which time Cuban fleet was allowed to return to Las Palmas and resume using it as a resupply, transshipment, and repair point.[774] The valuable tuna and swordfish catch could be transshipped at the Canaries for easy shipment to Europe, especially Spain. (See "XII. B. Trade".) One report indicates that 15 Cuban longliners operated from Las Palmas during

Photo 35.--This FLOCUBA trawler as well as the FAC longliners extensively used transhipment facilities at Las Palmas. Crews were also exchanged there. Chris Jones

1970, over half the fleet (appendix A4a).[775] A press report indicated that 24 tuna boats were operating out of Las Palmas in 1974.[776] The FAC's fleet of large longliners continued to be based at Las Palmas during the early and mid-1980s.[777] Las Palmas was a convenient supply and transhipment point for the Cuban fleet operating in the eastern Atlantic off western Africa. The growing financial difficulties resulting from reductions of Soviet subsidies, especially the fuel subsidy, forced he Cubans to close the Las Palmas base port in the late 1980s. Expenses at Las Palmas had to be paid for with hard currencies which were becoming increasingly scarce in Cuba. As a result, FAC in 1987 began to operate longliners deployed in the central Atlantic out of Havana rather than Las Palmas. The first two longliners shifted were *Sierra* and *Rascasio* in 1987.[778] Cuban longliners, however, continued to fish in the central and eastern Atlantic off western Africa, only out of Havana. Major changes occurred in the quantity and composition of the FAC catch after the shift from the Canaries back to Cuban ports (appendix C8e).

Macias Nguema (12°N): Cuban press reports indicated that the country's longline fleet began calling at Macias Nguema for the first time in 1974. Macias Nguema was formerly called Fernando Poo and is in Equatorial Guinea. Cuban officials reported at the time that access to African ports like Macias Nguema would allow the FAC longliners to spend more time on the fishing grounds and improve efficiency.[779]

Freetown (8°N): Cuban press reports indicated that the country's longline fleet began using West African ports, including Freetown in Sierra Leone, for the first time in 1974. The major port continued to be Las Palmas, but the various African ports were helpful to allow the vessels to reduce trip length and stay on the fishing grounds longer.[780]

Pointe-Noire (5°S): Cuban press reports indicated that the country's longline fleet began calling at Pointe-Noire in the Congo (Braziville) for the first time in 1974.[781] The port was used by both FAC and FCP which deployed trawlers in the south Atlantic off Namibia, then called Southwest Africa. While Pointe-Noire was well placed to service Cuban fishing vessels, the port infrastructure there was very limited, making it less useful than more distant Las Palmas.[782]

Guayaquil: Cuban officials expressed an interest in building port facilities at Guayaquil to support their trawl fisheries in the southeastern Pacific, but the arrangements never materialized.[783]

2. Cuban

The primary port used by the Cuban longline fleet is the port of Havana. The port was built by the Soviets in the 1960s as a part of the Soviet fisheries assistance program. The FAC used various smaller Cuban ports for its fleet of large and medium-sized longliners. The baitboat fleet landing skipjack and blackfin also use various small Cuban ports. Several of these ports are indicated on the maps in this report (figures 1 and 83).

Almendares: One 1949 report describes artisanal handline fishermen targeting marlin and rod and reel fishermen operating out of the Almendares River.[784] Cuban rivers are small so this may have been more of an inlet.

Arroyos de Mantua: This northwestern port is also referred to as Los Arroyos. It is located in extreme western Cuba (figure 1). It is used by the baitboats landing skipjack and blackfin for canning.[785]

Baitiquirí: Artisanal longline fishermen reportedly initiated operations off the southeast coast in 1984 from this port.[786] It is located in extreme eastern Cuba (figure 83).

Batabanó: Batabanó is an important port located along the southern coast. It is the center of Cuba's lobster fishery. It was also used by the tuna baitboat fleet and canneries were built there for the tuna. Cuban officials plan to open new port facilities at Batabanó. The facilities will be comparable to the new facilities opened at Santiago de Cuba in 1999.[787]

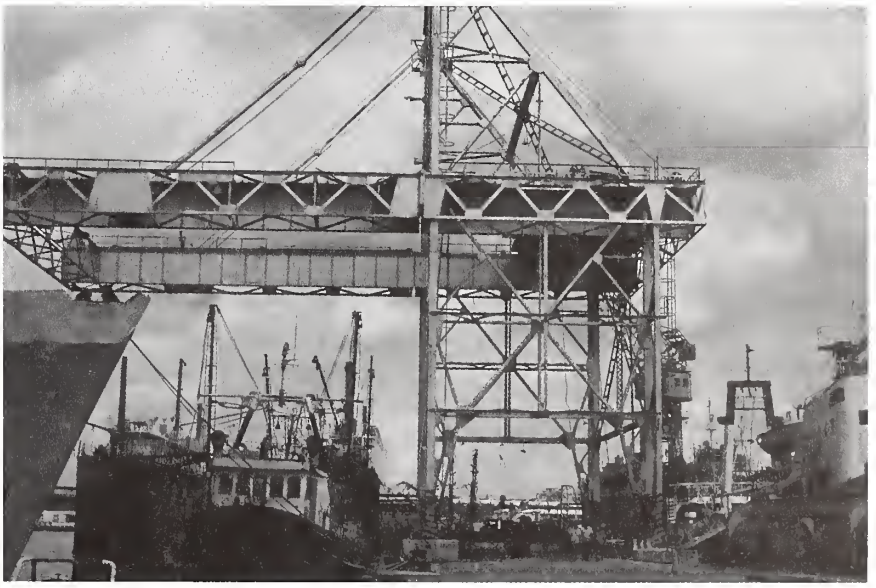


Photo 36.--The Havana fishing port in 1980 was a busy port handling both Cuban coastal and highseas vessels as well as Soviet vessels. The port is now much less used. D. Weidner

Photo 37.--Cienfuegos is one of the more important Cuban fishing ports along the southern coast. Much of the shrimp trawler fleet is based there.

The gear used was handlines and what sounds like a primitive longline assembly.[794] The term "commercial" was used as the report came from recreational fishermen. The authors have used the term "artisanal" to describe these small-scale fishermen. Baitboats were operated out of Cojímar and a cannery was built there.[795] Cojímar is known to have been an important center for the country's artisanal longline swordfish and billfish fishery along the northwestern coast through the 1980s.[796] The last references the authors have noted describing artisanal longlining from northwestern ports, including Cojímar, indicated that operations were still underway during 1984-85 and 1981-87 (appendices C4a2a-b and C4a4).[797]

Boca de Jaruco: Cuba researchers report that artisanal longliners were active here through 1987.[788] Presumably the longliners continued to operate after this time, but we have no more current information.

Cabañas: Cabañas is located about 65 km west of Havana. A 1949 report described artisanal handline fishermen targeting marlin as operating from the port on "another fine ground".[789]

Cabo Cruz: Longline and harpoon operations for bluefin were conducted in the 1960s, but sharp reductions in catches were reported in the 1970s.[790]

Caibarién: This northeastern port was also used by the baitboat fleet.

Cienfuegos: Cienfuegos is located along the south central coast. The fishing port with 705 m of piers is one of the largest in Cuba. Construction began in 1971 and was completed in 1976. Cienfuegos is extensively used by Cuba's shrimp fleet. The port has seven cold stores each with a 500 t capacity.[791]

Cojímar: Cojímar is a small port a few kilometers east of Havana. In the 1940s it was the center of the country's shark fishery.[792] Extensive fishing for swordfish and billfish, especially marlin, was also reported from Cojímar in the early 1940s, but may have been initiated in the 1870s.[793] Reports specified "commercial" fishermen landing swordfish.

(La) Coloma: This southwestern port is also used by the baitboat fleet and canneries were built there. The port was modernized in the early 1970s. A 492-m concrete pier was built in addition to a 500-t cold store.[798]

Gerona: This southwestern port is also used by the baitboat fleet and a cannery was built there.[799]

Gibara: Artisanal longline fishermen expanded operations off the northeast coast from this port in 1985 (figure 1). Earlier longline operations from Gibara has been seasonal, only during the winter focusing on white

Photo 38.--The Soviet-built Havana fishing port is the largest, most sophisticated fisheries facility in the Caribbean. Dennis Weidner

Figure 58.--Map of Havana harbor showing the fishing port (puerto pesquero) and processing facilities at Regla. Suárez Caabro

marlin.[800]

Havana: The principal domestic port for the Cuban commercial longliners is Havana (figure 58).[801] The port was designed and planned at the Institute of Projects in the Soviet Fisheries Ministry.[802] The Cubans claim Havana to be the largest and best-equipped fishing port in all of Latin America.[803] Cuban officials estimate the cost at 35-50 million pesos, the equivalent dollar cost is unknown.[804] The Soviets agreed to finance the construction of a modern fishing port at Havana in 1962 and construction began in 1963. The first phase of construction was completed in 1965. The port is located on 13.5 hectares in the southwestern part of Havana Bay. At the height of operations in the early 1970s it employed over 1,000 persons and four docks extending 1,380 meters. The docks were equipped with five gantry cranes, eight portal cranes, and one floating crane.[805] Not only can fishing boats be rapidly unloaded, but facilities like cold stores are readily available. The port has cold stores with a capacity of 11,700 tons and ice plants with a capacity of 40 t per 24 hours. An Italian firm was contracted in 1978 to build a modern tuna cannery at the port.[806] Little data is available on the extent of longline activity at Havana. One 1979 press report indicated that the FAC longliners landed the catch of 32 trips. Because FAC at the time had 19 longliners and 1 purseseiner, some vessels landed catches at Havana more than once.[807] The authors believe that more trips were landed at Las Palmas. In addition to actual fishery activities, repair facilities such as the Base Granma de Reparaciones de la Marina de Guerra Revolucionaria and the Empresa Nacional de Astilleros are located nearby.[808] An extensive area is devoted to vessel repair and maintenance, including 14 mechanized shops and a 2,500 GRT floating drydock.[809] A larger massive 4,500-GRT floating drydock was built in the Soviet Union and towed to Cuba in 1977.[810] Many of the fishing port facilities are today not extensively used. A fish meal plant adjacent to the port was to produce 2,000 t of fishmeal annually with two Soviet supplied production lines. It required 30 t of raw material daily. A third production line purchased in Denmark was added in 1969.[811] A 1971 report indicated that the fishmeal plants at the port requited 90 t of raw material daily.[812] Only minor quantities of fish meal were being produced in 2000. The port was extensively used as a support base by the Soviet fishing fleet. Soviet vessels were maintained on a quadrennial overhaul schedule.[813] The Cubans agreed to repay the Soviets, who financed the construction of the port by, over a 10-year period by servicing their distant-water fishing fleet.[814] With the decline of the Soviet fishing fleet, the maintenance and repair facilities in 2000 are not now being extensively used, although, as discussed above, Cuban companies are actively seeking foreign clients.[815]

Photo 39.--The Havana fishing port can accommodate large distant-water fishing vessels as well as even larger refrigerated cargo vessels. Dennis Weidner

Holguín: One report indicated that a few medium-sized longliners operated from Holguín during the 1980s making nocturnal sets for swordfish.[816] As Holguín is an inland city, the report probably referred to Gibara (figure 1).

Jaimanitas: A cooperative at Jaimanitas operated small longliners for swordfish and billfish off Cuba's northwestern coast during the 1970s. A 1981 study assessed the Jaimanitas Cooperative's billfish catch and found that the Cooperative's activities did not adversely affect the recreational catch, although the authors suggested that fishing be suspended on tournament days. The Cooperative reported very low billfish catches in 1979.[817] Cuba researchers report that artisanal longliners were active here through 1987.[818] Presumably the longliners continued to operate after this time, but we have no more current information.

Matanzas: The Soviets in 1987 financed the construction of a modern fuel depot at Matanzas, about 100 km west of Havana (figure 1). The port is cable of unloading supertankers. Construction was overseen by a French firm--SNUIE.[819]

Niquero: Niquero is located on the Granma Peninsula west of Santiago de Cuba (figure 1). Longline and harpoon operations for bluefin were conducted from this port during the 1960s.[820]

Nuevitas: This northeastern port is also used by the baitboat fleet (figure 83).

Pilón: Longline and harpoon operations for bluefin were conducted from this port during the 1960s.[821]

Pinar del Rio: Pinar de Rio is an inland city (figure 1). The baitboat fleet operated from several nearby ports and a cannery was built there.[822]

Punta Alegre: This northeastern port located a few kilometers east of Caibarién is also used by the baitboat fleet (figure 83).

Punta Gorda: Punta Gorda is located at Santiago de Cuba (figure 1). Longline and harpoon operations for bluefin were conducted from this port during the 1960s.[823] A fishing establishment operated at Bastuirí during the 1980s. Up to 10 longliners medium-sized longliners fished for swordfish making nocturnal sets. A detailed report in this fishery was prepared but never published by the CIP.[824] A similar operation was conducted from a port near Holguín, probably Gibara.

Puerto Esperanza: This northwestern port is also referred to as La Esperanza. It is located about 150 km west of Havana (figure 1). It is used by the baitboat fleet.[825]

Santiago de Cuba: Santiago de Cuba is the second most important fishing port in Cuba, after Havana (figure 1). It is also Cuba's most westerly port of any importance. Cuba's large refrigerated cargo ships would unload some of Cuba's distant-water catch in Santiago.[826] Artisanal longline fishermen initiated operations off the southeast coast in 1984 from Santiago. began to be conducted off the south east coast out of Santiago and Baitiquirí.[827] A 1988 Cuban paper reported continued swordfish longlining out of Santiago.[828] Authorities built a 220-m jetty to accommodate large fishing vessels in 1984.[829] A major expansion program was launched in 1998. Cuban officials opened the new facilities during June 1999, including a 5,000 t Japanese-made cold store. The plant also acquired refrigerated cargo trucks to transport seafood to domestic markets. The Cubans are offering port services to neighboring countries and claim that arrangements have been made with fishermen from the Dominican Republic, Haiti, Jamaica, Mexico, and Venezuela.[830] The state company Marlín S.A. announced in October 1998 that it was expanding the Santiago de Cuba Marina at Punta Gorda. The Marina could only accommodate 12

recreational boats and was being expanded to handle up to 60 boats.[831] On rare occasions, one of Cuba's commercial longliners might call at Santiago rather than Havana. Such calls, however were unusual as the longline fleet primarily operated out of Havana.[832]

(Las) Tunas: The MIP processing enterprises operating in the inland town of Las Tunas (figure 1). They were supplied by the nearby ports focusing largely on finfish taken on the shelf ("plataforma")..[833] "Tunas" of course suggests, to the English-speaking reader, a port from which tuna fisheries may be conducted. Of course the Spanish word for tuna is "atún." "Tuna" in Spanish refers to the fruit of the prickly pear cactus. Details on the species handled at the port are unavailable, but are believed to be primarily demersals taken on the shelf.

B. Foreign usage

The major foreign country using Cuban fishing ports were the Soviets.

Soviet era: Cuba served as an important repair and supply point for the Soviet fishing fleet during the 1960s-80s. The Soviet Union operated the world's largest distant-water fishing fleet (appendix A7). Expenditures associated with bringing a vessel operating in the south Atlantic or south eastern Pacific back home to Soviet ports were significant as were the cost of servicing vessels in foreign shipyards which demanded hard currency. As a result, the port of Havana was important to the Soviet fishing fleet. There was no need for hard currency payments in Havana. Payments for port services were largely credited against Cuba's enormous debt to the Soviet Union and thus were essentially cost free to the Soviet fishing fleet. Such activity, however, for the same reason generated little real income for Cuba.

1990s: The authors have no hard data on Russian vessels using Havana. The reduction of the Soviet/Russian fishing efforts off Latin America (Peru/Chile in 1991-92 and Argentina in 1993) suggests that Russian use of Cuban ports must have declined substantially since 1991. Reports from Cuban sources suggest that few Soviet fishing vessels used Havana in the early 1990s. A very small number of Russian fishing vessels used the port in 1992-93, but none have been noted since 1994.

Current situation: As far as the authors can determine, the Cubans no longer provide support to Russian fishing vessels. Cuba undoubtedly would like the Russians to use the Havana port as it could generate earnings needed to purchase Russian oil. The Russians who no longer subsidize a massive distant-water fleet, however, now have little need for a base port in the Caribbean.

The Cubans are now encouraging foreign countries to use their port facilities to generate foreign currency earnings. There is some foreign traffic through the port. Cuban officials report that foreign countries are using their port facilities, but no details are available. Argus, the state company running Cuban shipyards, maintains an English-language internet site to attract business.[834] The authors have noted reports of Taiwan-owned longliners flagged in Panama and the Philippines in Cuban waters. Some of the vessels have been sighted moving into Havana harbor.[835] Others were making sets in Cuban waters, probably on the way to and from calls at Havana. The authors have no details as why the Taiwan boats were calling at Havana. Repair and maintenance would appear to be the most likely possibility. Taiwan officials report that there are no official contacts between Cuba and Taiwan and that there are no known Taiwan companies with commercial contacts with Cuba. Officials also insist that there are no Taiwan-owned longliners flagged in Panama.[836]

Photo 40.--The Havana fishing port was extensively used by Soviet trawlers during the 1960s-80s. The Cubans repaid the Soviets for building the port through port services. Dennis Weidner

IX. Transshipments

The FAC longliners transshipped their catch off West Africa through Las Palmas in the Spanish Canary Islands. FAC also used various African ports. (See "Ports.") Cuba is almost unique in the Caribbean where the general pattern is to serve as a transshipment point for foreign longliners operating in the Caribbean or adjacent Atlantic grounds. No actual transshipment data, however, is available on the extent of the transshipments, although some import data is available from the countries to which product was shipped.

A. Cuban transshipments

Cuban longliners and their single seiner land/transship part of their catch in Las Palmas in the Canary Islands. Cuba authorized the ICCAT sampler at Las Palmas to collect data on the catch. ICCAT reports that Cuban vessel captains were reportedly not always cooperative, but that the Cuban delegate in Las Palmas was cooperating.[837] Most of the Cuban eastern Atlantic catch is transshipped through Las Palmas. Cuban press reports, however, suggest that some product is also transshipped through African ports.[838] The authors believe that most of the Cuban transshipments were tuna and swordfish transshipped to Europe and Japan. Cuba also took substantial quantities of shark. The authors believe that the shark catch was mostly marketed in Cuba, but no information is available as to how the shark catch was shipped to Cuba.

Photo 41.--Cuban processing plants received large quantities of jack and horse mackerel caught in distant-waters for raw material. FLOCUBA deliveries during the 1990s ceased. D. Weidner

B. Foreign transshipments through Cuba

The authors have no details on foreign transshipments through Cuba. There are some indicators, however, that some such transshipments have taken place. Foreign fishing vessels do call in Havana.[839] Fishing vessels from the following countries are known to have called in Havana:

Japan: One Japanese source listed Cuba as a Caribbean "landing base" during the 1950s and 60s.[840] The Japanese played a key role in the development of the Cuban tuna longline fleet. (See "Foreign aid.") Thus the Cubans may have permitted transshipments. At the time, Japan had an active longline fishery in the Gulf of Mexico and Caribbean (Caribbean Overview, appendix D4), but could not transship through U.S. ports. Thus Havana would have been a convenient transshipment point. While Japan now makes at sea transshipments, during the 1950s-70s, Japan was dependent on ports near fishing grounds for transshipments.

Taiwan: Taiwan-owned longliners in 1999 have been observed in Cuban waters moving into Havana harbor.[841] The authors can not explain their presence. Transshipping is one possibility, but vessel repair and maintenance would seem to be more likely.

USSR: Large numbers of Soviet fishing vessels routinely called at Havana beginning in 1965 when the first stage of construction was completed. Soviet trawlers operating in distant-water fisheries were serviced in Havana rather than bringing them back to Soviet ports. The Soviet trawlers also presumably transhipped some of their catch in Havana, although the authors have no actual data on the quantities involved.

X. Processing and Products

Cuba has one of the most modern seafood processing industries in Latin America. Much of the production of the Cuban industry is exported or sold domestically in dollar stores. Only a limited range of the output of Cuban processing plants is available to Cuban consumers for pesos. The processing of swordfish and other large pelagics is limited, but some processed commodities are produced. The processing plants at Regla, the Havana Fishing Terminal, are widely distributed in the domestic market. Given the importance of export markets, MIP has given considerable importance to meeting HACCP standards.

A. Processing industry

Cuba has a well developed processing industry which has proven capable of meeting rigorous import standards and packaging requirements of the European Union and Japan. The authors have noted a variety of references to the number of processing companies and plants in Cuba. The Cuban Government reports operating 16-17 major seafood processing plants.[842] All Cuban processing plants are managed by INDIPES. These large processing plants are located at: Batabano, Caibarién, (La) Caloma, Casilda, Cienfuegos, Guantánamo, (La) Havana (Cojímar, Hacendados, and Regla), Isla de la Juventud, Manzanillo, Matanzas, Niquero, Nuevitas, Santa Cruz del Sur, and Santiago de Cuba. The production of these large plants is mostly directed at export markets or domestic hotels, restaurants, and stores requiring payment in dollars. The plant at the Terminal Pesquero de Regla processes product for the domestic market.[843] INDIPES also has about 20 smaller processing plants.[844]

B. Processing large pelagics

The authors have been able to find only limited information on Cuban processing of swordfish and other species taken in the longline fishery. The MIP company processing the longline catch is INDIPES. The authors believe that much of the catch of valuable species (especially tuna and swordfish) was in the 1960s-1980s exported. This may have been less true in the 1990s as the FAC in 1987 shifted from their Canaries base to Cuban ports. In addition, the appearance of dollar stores meant that products could be sold for dollars without exporting it. We have little, information, however, about the actual availability of swordfish, tuna, and other species taken by longlines in Cuban stores.

Products made from the longline catch include fresh and frozen fish, canned tuna, shark fins, smoked billfish, and shark liver oil.[845]

Fresh and Frozen: INDIPES reports that it has developed considerable expertise in producing fresh and frozen fillets and other cuts. The company has 10 cold stores with a total capacity of 6,300 cubic meters. Processed fresh and frozen products include fillets (sailfish and dorado), strips (blue shark, dorado, and blue marlin), slices (bonito), and steaks (cero mackerel).[846] The principal export market for Cuban swordfish appears to be Spain and appears to be exclusively unprocessed frozen trunks (appendix E3). Swordfish was also sold to the Japanese, also mostly trunks. Most of the FAC longline catch was sold as whole or gutted fish. The primary species produced by FAC was yellowfin tuna. The inability of FAC to install ultra-low temperature freezers on their longliners,

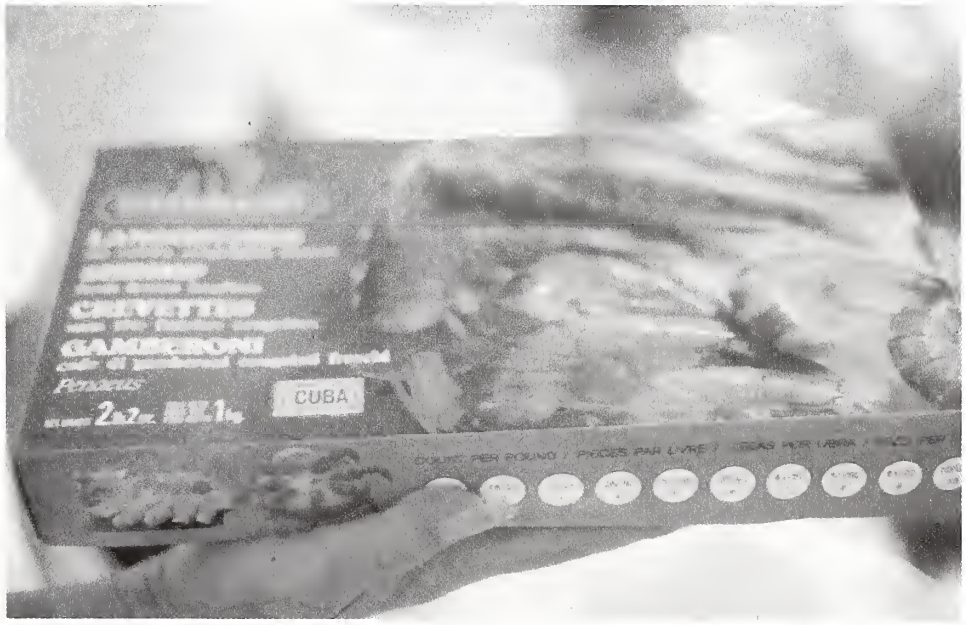


Photo 42.--Cuban's modern seafood processing industry has high standards. Much of the production of the most valuable species, like this shrimp, is exported--notice the label in four languages.

Photo 43.--Cuban has a small canning industry. This 1993 photograph shows jack mackerel, but tuna and many others species are also canned.

however, severely limited the quality of the swordfish delivered.[847] For this reason, the Cubans were unable to market significant quantities of tuna in Japan.
Canned: Canned products are produced at INDIPES' Indal cannery. Much of the canned product is tuna and tuna-like species.[848] Products include tuna in oil molded bonito chucks in oil, fried tuna medallions, and mackerel chunks in oil or tomato sauce.[849] The canned tuna is available in many different packs.[850]
Cured and dried: INDIPES produces a variety of smoked products, including species from the longline catch. Smoked products include sailfish strips, blue marlin strips, and bonito slices.[851] INDIPES also dries shark fins. FAC and other Cuban enterprises reported a very substantial shark catch. While Cuba's longline fleet initially targeted tuna, by the late 1980s, shark had become the major species taken. Cuban fishermen in some years caught over 5,000 t of shark, but routinely reported catches of 2,000-3,000 t (appendix C11a). The authors, however, have little information on the disposition of the Cuban shark catch. No information is available on this, except the company says that it is "mushrooming ahead". INDIPES also produces shark liver oil.[852] Cuba has supported effort to create regional standards for dried shark fins.[853]

The artisanal fishermen who land tuna, swordfish, sharks, and related species along the northwestern coast are only licensed to catch the fish. They are required to deliver their catch to state-owned companies who then process and market it.[854]

C. HACCP

The adoption of Hazard Analysis and Critical Control Point (HACCP) procedures by major seafood importing countries required MIP to institute a HACCP program which it did in 1995. Cuban officials have worked closely with the European Union (EU) and 15 Cuban plants have been approved for export to the EU. Cuban officials also estimate that the cost of quality control measures since 1995 have dropped 45 percent, suggesting that spoilage, waste and rejected shipments have declined measurably.[855]

XI. Companies

The Cuban fishing industry is conducted through 16 state-owned enterprises which include separate facilities for port services and the processing and marketing of fishery products. Many of these companies have modern facilities designed to supply high-quality product (especially lobster and shrimp) to export markets. One report indicates that six of these facilities have been rebuilt since 1980 and many others have been substantially modernized.

A. Organization

MIP as a result of the financial and economic dislocations of the early 1990s has carried out a broad-based reorganization. MIP has introduced a variety of free marketing reforms designed to improve the industry's efficiency by giving greater autonomy to fishermen and increasing incentives. MIP officials report that the reforms are reducing operating costs and improving production efficiency. The MIP reforms, however, continue to maintain state control over the industry. A Cuban official stresses that the increased autonomy does not mean that the associations operate outside of the regulations and guidelines set by MIP. The fishing vessels are still state property and they operate under fishing quotas set by the Fisheries Advisory Committee--a MIP unit.[855] Fishermen have to deliver their catch to state buyers who pay prices fixed by the Government.

1. Former industry organization

MIP through 1995 administered a highly centralized fishing industry composed of a large number of enterprises. The actual organization and the enterprises involved have varied over time.

Early 1960s: The Government promoted the existing cooperative movement, establishing many new coops and large production-processing enterprises called combines "combinados".

1975: A new System of Economic Management and Planning (SDPE) was introduced in 1975. It was an attempt to further centralize the industry. Eight large combines were created and 10 fishing enterprises out of the existing combines. The cooperatives were incorporated into this system and while some retained the title cooperatives, the fishermen essentially became state employees. One report indicated that MIP administered 63 different companies or enterprises. The Flota de la Plataforma (FP) or inshore fleet was composed of 18 enterprises. Two enterprises managed processing plants and one enterprise the distant-water fleets (FCP, FAC, and FG). Several other enterprises were involved in fishery-related activities, including vessel construction and maintenance, export (CARIBEX), training, research, and other activities. MIP very tightly controlled fleet operations.[856]

1996: Major reforms were introduced in 1996 to decentralize the industry and introduce incentives to reduce costs and increase production. New companies were formed combining many smaller companies. Provincial Fishing Associations were established. (See "3. Reorganization"

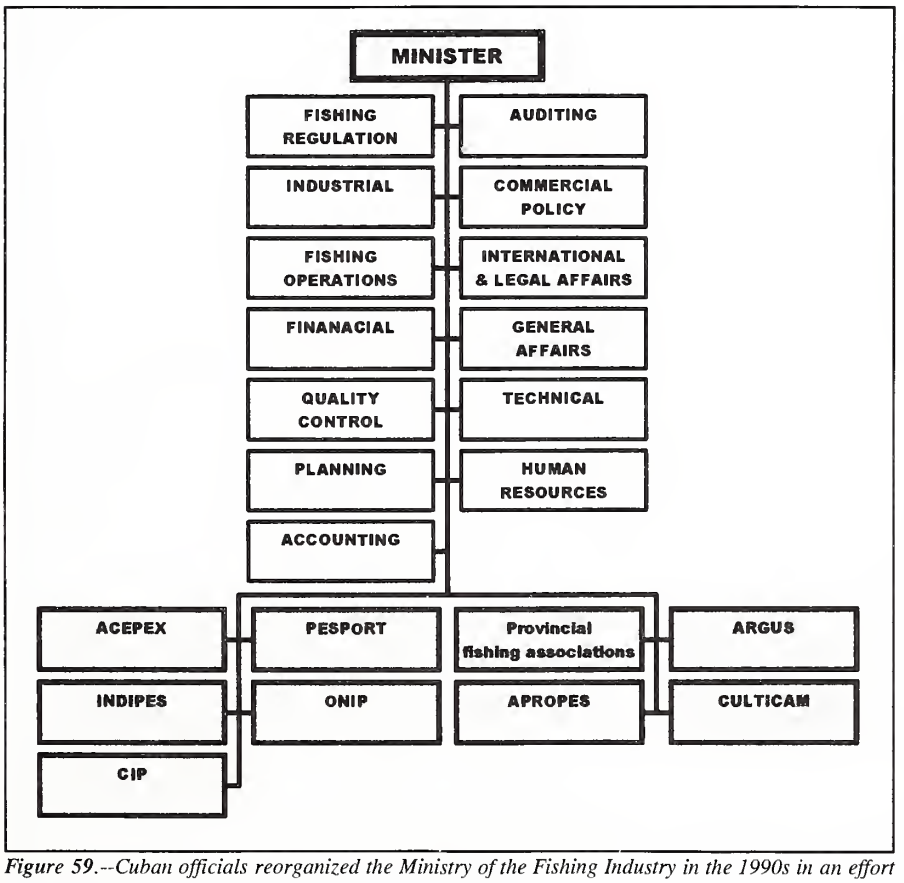


Figure 59.--Cuban officials reorganized the Ministry of the Fishing Industry in the 1990s in an effort to give it an efficient, more business-like structure. Adams

below.)

2. Longline operations

Cuba has conducted two different longline operations taking swordfish and other oceanic pelagics, a small artisanal and much larger commercial operation. Different types of enterprises or companies conducted these operations. Fishing operations were centrally controlled. These enterprises were only responsible for fishing operations. Marketing and exporting were and continued to be handled by separate companies closely controlled by the MIP. While there has been some shift in recent years to less central control on fishing operations, there is no indication that the MIP plans to allow the fishermen control over how their catch is marketed, especially if it is product which can be exported or sold for hard currency in domestic dollar stores.

Fishing vessels in Cuba have been operated by cooperatives, fishing associations, and state corporations organized into different fishing fleets.
Artisanal: The authors do not have complete information on the enterprises conducting the artisanal longline fishery off Cuba's northwestern coast. Artisanal fishermen in the 1960s were organized into cooperatives. The artisanal longline fishery appears to have been conducted by the Flota del Golfo (FG). Cooperatives may have also been involved. The country's state fishing industry is in 2000 organized into different companies which the Cubans call "associations", located in each of Cuba's provinces (figure 61). Several of these companies appear to be involved in the swordfish and longline fisheries. Basic information about many of these companies are unavailable as company representatives are difficult to reach and have generally declined to provide information about their operations. In addition, several companies have been renamed as part of reorganizations, complicating the use of some of the historical sources available to the authors.
Commercial: Cuba's commercial tuna and swordfish fishery was launched by FCP which operated the large commercial longliners imported from Japan and Spain during the 1960s. MIP in 1973-74 created a separate fleet, the Flota Atunera de Cuba (FAC) to manage the country's tuna fleet consisting of longliners and one seiner. The FCP and FAC operations were a major activity in Cuba. The Cubans from a fairly early stage, however, began to question the profitability of distant-water longlining. Notably no additional longliners were purchased after the 1960s.

The authors do not have detailed information on how Cuba's tuna and swordfish was marketed.
Artisanal: The authors have no information on how the artisanal catch was utilized or marketed. As it was landed on the island by artisanal fishermen without the modern refrigeration equipment of the commercial fleet, exporting the catch would have been more difficult than the frozen fish landed by FAC which exported through the Canary Islands. Much of the catch may have been marketed fresh.
Commercial: Most of the catch of swordfish and preferred tuna species is believed to have been exported. This may have changed somewhat over time, especially after 1987 when FAC, as an economy measure, shifted commercial longline operations from the Canary Islands back to Cuban ports. FAC did not, however, actually export the product. Exporting is a critical issue in Cuba because it means access to scarce hard currency. Thus specialized companies handle exports and the proceeds are apportioned to state enterprises on the basis of need and overall Government priorities. FAC's catch was exported by a Cuban Government export company. FAC received hard currency to buy fuel and imported equipment, finance necessary hard currency costs associated with distant-water fleet operations.[858]

Access to its own foreign currency earnings has been an ongoing problem for FAC. The amount of the hard currency earnings returned to FAC was based on a company request which was evaluated by the Planning and Finance Directorates in MIP.[859] A company like FAC need hard currency to sustain operations because it operated on grounds at some distance from Cuba. After the Soviet fuel subsidy was curtailed and then ended, hard currency became increasingly necessary to purchase fuel and other imported products. The shortage of hard currency was the major factor limiting FAC's operations in the late 1980s and early 1990s. Given the fact that by the 1990s that FAC was catching mostly shark with limited export value, they may have well required more hard currency to maintain operations than they were actually producing through exports.

3. Reorganization

The loss of the Soviet fuel subsidy forced Cuba to drastically reorganize and reform its fishing industry, including its fishing companies and associations. Cuba had been conducting fisheries that were not profitable in market terms, but were pursued because the Soviet oil subsidy and other support significantly reduced the actual Cuban outlay. This was no longer possible when Soviet subsidies ended.

Cuban officials as part of the country's economic reforms during the 1990s are promoting the decentralization of economic activity. Many of these reforms were enacted in 1996, radically reforming the structure of the industry.[860] Some of the key elements and policy shifts connected with the reorganization of the fishing industry include the following:

Accounting: Accounting procedures in Cuba have been radically changed. As part of 1990s reforms, Cuban companies were required to prepare budgets and accounting procedures to calculate real expenditures and earnings.

Decentralization: The major effort in the fishing industry has been to conduct more fishing activity through Asociaciones Pesqueras Provinciales (APPs) rather than large state fishing fleets like FAC. Fishing operations and processing was decentralized. Autonomous producer associations were established, the provincial fishing associations (APPs). More control was given to fleet operators over vessel operations and financial management.[861] Cuban officials concluded that if the fishing boat crews were responsible for operating costs that would make more cost-effective judgements on both operations and maintenance. (See "Provincial fishing associations" below.) The APPs were not, however, given control over selling their catch.

Labor contracts: A controversial in Cuban Government circles is worker incentives. Some officials object to pay incentives on ideological grounds. Others feel that they are necessary to stimulate increased production. Special Labor Contracts (SLCs) were arranged with vessel crews to increase productivity. A December 1998 report indicated that the new contracts had been implemented on 700 boats or 25 percent of the vessels up to 20-m long. Eventually all Cuban fishing vessels, except for large commercial boats, will be covered by SLCs. The fishing boats, while operated by the crews who now have to cover operating costs and share profits, remain state property.[862] The authors do not have a copy of these contracts, but unconfirmed reports indicate that they provide for bonuses for production over set quotas and partial payments in U.S. dollars.

Intensified enforcement: The Cuban media in recent years has increasingly reported on Government actions against illegal fishing. The new Office of National Fishing Inspectors is responsible for enforcing fishery regulations. Recent enforcement actions have been widely reported in the official media.[863] Government press releases on this subject are also reported by the anti-Castro Miami Cuban press.[864] Reports of illegal fishing were in the past never publicized widely in Cuba.[865] It is unclear if this is a problem which has always existed or a relatively new development that is just now being publicized. It appears likely that it is a problem that has primarily developed in the 1990s. It may be a consequence of the legalization of U.S. dollars and the developing tourist industry, creating a profitable new market for contraband seafood that did not previously exist. The increased autonomy of the provincial fishing enterprises may be another factor. The penalties for infractions of fishing regulations are quite severe. Individuals risk confiscation of vehicles, boats, and equipment.[866] Cuban sources in 2001 report "notable results" in controlling illegal fishing.

Species: More attention was given to high-value species like lobster, shrimp, reeffish, and others available in coastal waters. Unprofitable operations like fuel-intensive mid-water trawling for jack mackerel in distant waters were curtailed or ended.[867]

Aquaculture: Cuba's fledgling aquaculture industry was promoted to help replace the fish that had been caught on distant-water grounds and to expand exportable species like shrimp.

Other: A variety of other changes were announced, including upper level management changes, establishment of a "clear, flexible, and dynamic development strategy for fisheries management," reorganization of MIP, and training in new management techniques for directors and managerial personnel.[868]

MIP continues to administer fisheries and manage the fishing industry. The structure of the fishing industry has been radically changed. The industry now consists of only 21 associations. Most are the 15 provincial fishing associations. There are, however, in addition six specialized associations.

Coastal fisheries: Cuba's coastal fisheries will be administered by 15 Provincial Fishing Associations (APPs), one for each province. These associations are in many ways similar to the former cooperatives. These associations vary widely in size and character because of regional differences in the size of the local fishery and species targeted. each association, however, will have at least 20 boats--all of which will continue to be owned by the state through MIP.[869]

Offshore fishing: PESPORT is responsible for offshore fleet operations formerly conducted by FCP, FAC, and FG. One Cuba source also referred to the Asociación de Pesca de Alto.[870]

Purchasing: ACEPEX appears to be the authorized seafood marketing agency. The APPs have to sell their catch to ACEPEX at set prices. ACEPEX is also responsible for all exports of Cuban seafood.

Inputs: APROPES is responsible for inputs, supplies, and imports.

Domestic sales: INDIPES is responsible for processing and domestic sales.

Shipyards: Argus manages Cuban shipyards, both

vessel construction as well as repairs and maintenance. **Shrimp**: A special association exists for shrimp culture (CULTICAM). MIP hopes to develop shrimp culture as a major commercial activity in Cuba.[871]

One Cuban source provides a somewhat different assessment of the organization of the fishery associations. She indicates that MIP has formed associations on a functional rather than regional basis, such as Asociación de Pesca de Plataforma and Asociación de la Producción de Langosta.[872]

Many of these MIP reforms are a significant departure from centralized state control to a more flexible approach. Some officials are concerned about the extent of the changes in a socialist economy. Basing wages on productivity is a ideological concern to many. It remains to be seen, however, just how effective the MIP initiatives will prove. It is unclear as to what extent the MIP is willing to decentralize. While the APPs are now conducting much of the fishing operations around the island with less centralized control, these associations are by no means independent entities. The vessels remain Government property. No independent fishing is allowed. The fishermen have to belong to producer associations. The associations, most importantly, have no control over how their catch is marketed. This is all handled by the Government through a state purchasing company--ACEPEX. There is no indication at this time that MIP is willing to truly decentralize the industry by allowing the fishermen to market their own catch. Such a decision would be a major change, greatly reducing state control over the fishing industry. As a result, it is unlikely that it will be instituted in the near future.

One interesting aspect of the Cuban fishing industry is that the centralized management structure has provided a level of control over fishing effort that fishery managers in other countries do not have. This would theoretically allow MIP to carefully manage fisheries within strict catch limits to achieve optimal yields. Such controls are far greater than the management authority of fishery agencies in most other countries. Even so, Cuban coastal resources are exploited very heavily.[873] The 1996 reforms have reduced MIP control to some extent. Perhaps more importantly, since Cubans can now possess dollars the temptation has become very great for the fishermen to divert some of their catch into the black market. The difference between such illegal sales and what the fishermen receive if their catch is delivered to the association is enormous. The authority and reach of law enforcement, however, is greater than in many other countries.

4. FAC and reorganization

FAC was one of the Cuban companies most affected by this reorganization. The FAC operations began to decline in the late 1980s when catch levels and earnings fell and operating expenses increased. By the early 1990s FAC was using fuel which had to be purchased with hard currency. The aging fleet was increasingly expensive to maintain and needed parts had to be imported, another foreign currency expense. In contrast, by the 1990s FAC's catch of valuable species like tuna and swordfish had declined to very low levels (appendix C8e) and most of the catch was shark which had little or no export value, except for the fins. FAC is believed to have been closed in 1996 and the fleet sold. A few longliners continued to operate, although the authors are not sure about the corporate entity.

5. Future enterprises

The future direction of Cuban enterprises is unclear. The entire basis of the Cuban economy until the 1990s was rigid central control. The economic crisis of the early 1990s forced the Government to permit small independent businesses to operate. They are heavily taxed and regulated, but allowed to operate. Really "successful" operations, however, are discouraged.[874] Very successful enterprises have been closed. Authorities are especially vigilant when an individual begins to hire people outside his family. Cuban officials believe that this would create a intolerable economic gap between Cubans. Cuban officials increasingly talk of decentralizing. The fishing industry, however, continues to be tightly controlled. The boats are owned by the government. Individual captains and crews now have more autonomy than in the past, but they have to sell their catch to the government at set prices. It is unclear to what extent the government will ease controls on the fishing industry or how much energetic fishermen will be able to increase their incomes through hard work.

B. Individual companies

The following information is available on individual Cuban fishing fleets, companies, cooperatives, and producer associations. These entities are believed to be currently involved in the swordfish or longline fishery or related activities such as marketing or vessel maintenance. Details are in most cases sketchy as company managers have been generally unwilling to discuss their operations.

ACEPEX: The authors have few details on this company, but it has become a key state corporate entity in the Cuban fishing industry. ACEPEX appears to be the exclusive state purchasing agent which buys the catch of the APPs. ACEPEX as all state fishing industries under the 1990s reorganizations reports directly to the Fisheries Minister (figure 59). The prices it pays to the fishermen are set annually by MIP and "industry". Prices for seafood marketed domestically are theoretically determined by operating costs. Prices for exported product are determined by costs and the international market.[875] The authors have been unable to determine precisely what the process for setting the prices is and how "industry" participates. We do not know to what extent input from the fishermen is permitted.[876] One report indicates that ACEPEX is also the sole company in Cuba authorized to export seafood. The authors note that this was once done by CARIBEX. The recurrent relationship between ACEPEX and CARIBEX is unknown.

AGECREW: A new company, AGECREW, was formed in 1996 to secure jobs for unemployed Cuban fishermen aboard foreign fishing vessels and in related port services. AGECREW is located in the port of Havana. AGECREW specializes in fishing vessel crews. A similar Cuban company, Güincho, also seeks to place unemployed fishermen. Both AGECREW and Güincho belong to the PESPORT group. AGECREW hires out Cuban marine workers to companies in Europe, Latin America, and Africa. AGECREW reports signing a contract in October 1999 with Coral Suki S.A. to operate factory trawlers off North Africa. The jobs involved ranged from vessel captains to crew members.[877] The AGECREW complies with the special training certifications such as those established by IMO, ISO 9200, and TF. The company maintains a training facility to prepare the fishermen to work on foreign vessels that may have specialized equipment with which they are unfamiliar. AGECREW is not the only Cuban company employing Cubans abroad on foreign fishing vessels, but it is the oldest and most experienced. A list of clients is not available, but AGECREW reports contracts with companies on "five continents," including companies in Italy and Spain. Some contracts involve more than just crews and AGECREW has arranged for the deployment of Cuban vessels as well as crews. Most contracts require the foreign contractor to pay crew salaries and in addition a fee or tax and social security payments to the Cuban Government for the fishermen. AGECREW also operates a consulting subsidiary, the Servicio de Consulta Marina.[878]

Argus: Argus is a Cuban association of several different companies involved with naval architecture, vessel repair and maintenance, and other specialized services. These companies primarily service the Cuban fishing industry, but they are actively involved in efforts to attract foreign clients willing to pay in hard currency.

Avos is the export arm of Argus and handles, for example, the export sales of GRP fishing boats built in Cuba.[879]

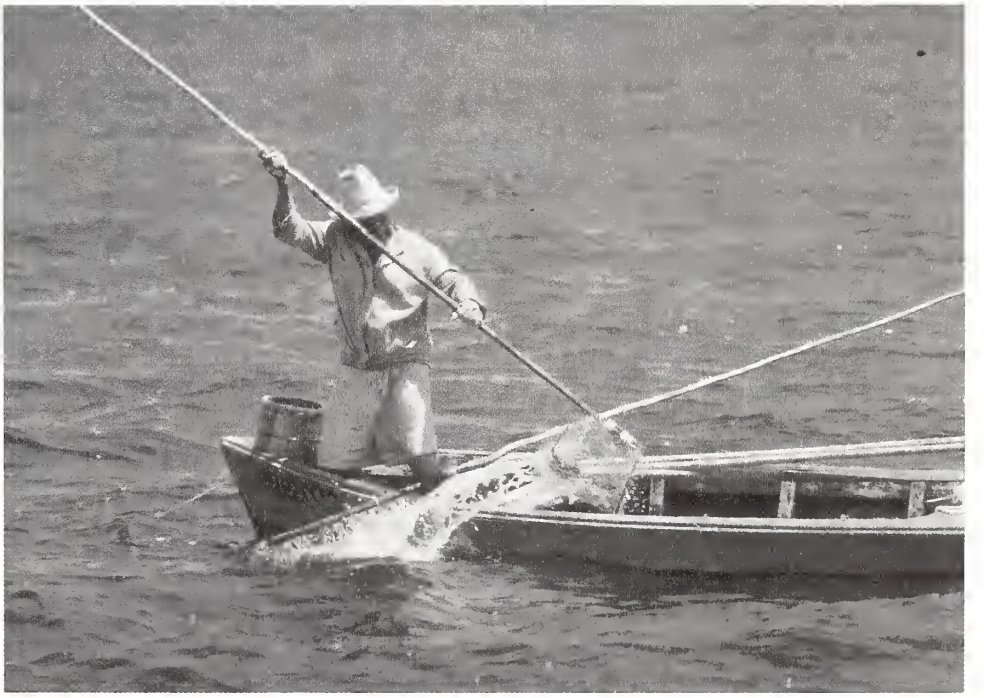


Photo 44.--Most small artisanal fishermen worked as part of cooperatives. They have now been integrated into the provincial fishery associations.

As with most of Cuban industry, exporting and access to hard currency is usually separated from the producing companies.

Asticar provides specialized naval repair services including services from floating docks.[880] Cuba's various shipyards are also part of Argos.[881] (See "Shipyards".)

Comelec constructs and repairs electrical boards and provides stainless steel items for naval and industrial use.[882]

Navalec repairs electronic and navigational equipment.[883]

Ceprona provides consulting services for the construction of vessels and naval equipment.[884]

Boca de Jaruco: This is one of the fisheries establishments or cooperatives that were conducting the artisanal longline fishery for swordfish and billfish along the northwestern coast through the 1980s. The formal name appears to have been the Cooperativa Pesquera de Boca de Jaruco.[885] The last known reference the authors have noted referred to an establishment ("establecimiento") at Boca de Jaruco which was operating artisanal longliners during 1984-85 (appendix C4a2a-b).[886] The authors do not know the current status of this enterprise. All or most of the cooperatives appear to have been closed and have been replaced or absorbed into the APPs.

Cabañas: This is one of the fisheries establishments or cooperatives that conducted artisanal longline fishing for swordfish and billfish along the northwestern coast through the 1980s. The formal name appears to have been the Cooperativa Pesquera de Cabañas.[887] The authors do not know the current status of this enterprise.

Caribbean Exporting Company (CARIBEX): This company is the MIP dependency which transacts export sales. It is one of the oldest of the Cuban state-owned companies. They are the exclusive Cuban entity authorized to export or import seafood. CARIBEX maintained offices in Madrid, Milan, Paris, Tokyo, and Toronto.[888] The various state-owned fishing (production) companies are not allowed to export their production. The catch of the state fleets is not marketed by those fleets. Rather export sales are made through this company. CARIBEX thus played a key role in fisheries such as the tuna and swordfish fisheries where much of the catch is exported. The foreign exchange earnings from the export sales are not returned to the producing companies, but rather to the Cuban Government. The producing companies must then request and justify the foreign exchange neccssary for its operations. CARIBEX's primary products are lobster and shrimp. The company also exports fresh and frozen fish, including swordfish and tuna.[889] They also handle a variety of specialty products like shark fins.[890] Given the quantities of sharks taken by FAC and other Cuban fishermen (appendix C11a), CARIBEX would have a substantial supply to market. CARIBEX appears to have focused its activities on the Canadian, European, and Japanese markets. Some information on the success of these operations can be seen in the information available on Cuban exports. (See "XII. Marketing".) The company had an office in Toronto, Canada and during the 1970s and 80s requested information from the authors on the U.S. market. Some Cuban product may have entered the United States through Canada. A subsidiary of CARIBEX, Grupo Caribe, is responsible for marketing in the Caribbean and Latin America.[891]

Photo 45.--Cuban live-bait tuna boats or "boniteros" were once managed by the Flota Cubana del Golfo, but are now operated by the new provincial fishery associations, probably Pescario.

Cojímar: Cojímar in the 1940s was the center of the country's shark fishery.[892] Fishing for swordfish and billfish was also reported from Cojímar in the early 1940s.[893] Cojímar is known to have been an important center for the country's artisanal longline swordfish and billfish fishery along the northwestern coast through the 1980s. The formal name appears to be the Cooperativa Pesquera de Cojímar.[894] The

last known reference the authors have noted referred to an establishment ("establecimiento") at Cojímar indicates that it was still operating artisanal longliners during 1984-85 (appendix C4a2a-b).[895] The authors do not know the current status of this enterprise.

Combinados Pesqueros: Cuba created a number of large vertically integrated fishery combines or enterprises ("combinados pesqueros") in several fishing ports. These operations included both the fishing and processing operations. As part of the 1990s reforms, these combines were absorbed by the new provincial fishery associations.

COPMAR: COPMAR is a subsidiary of INDIPES, It is the wholesaler responsible for distributing rationed seafood in Havana. The company distributes 3,500 t per month to the general public, "priority" institutions, and other entities in Havana. COPMAR supplies a total of 2,000 clients.[896]

CUBAPESCA: CUBAPESCA was a Cuban state company entity authorized to import vessels and equipment for Cuban fishing fleet. CUBAPESCA was, for example, the agency assigned to acquire a fleet of tuna purse seiners. The company selected Peruvian shipyards and worked with them over a protracted period. The contract eventually had to be canceled for cost overruns and non-compliance. In the end, Cuba never acquired a fleet of tuna purseseiners. The company during the 1970s was absorbed by MARPESCA.[897]

Flota Atunera de Cuba (FAC): The Cuban Tuna Fleet (FAC) operated the large fleet of commercial longliners deployed in distant waters. The Cuban tuna fleet was initially established as part of the Flota Cubana de Pesca (FCP). The first FCP vessels were in fact longliners and during the 1960s, longlining for tuna and swordfish was the Cuba's primary distant-water fishery. Gradually FCP began to acquire distant-water trawlers, initially used Soviet vessels. Trawling gradually became an increasingly important part of FCP's operations. Cuban officials in October 1974 formally decided to form a separate fleet organization for the tuna operations, the Flota Atunera de Cuba (FAC).[898] The two fleets in 1973 had been operating separately, but the formal division apparently took place in 1974.[899] Roberto Ferrer, who was to become a future Fisheries Minister was appointed FAC's first Director. FAC officials reported that the differences in the grounds, vessels, gear, and technology made it easier to operate FAC as a separate unit. It also reportedly facilitated the development of better personnel and training practices.[900] The longline fleet at its peak in 1967-69 consisted of about 26 commercial longliners (appendix A4c). When FAC was established in 1973-74 there were 23 commercial longliners in the fleet. FAC inherited the adverse cost structure under which the Cuban longline fishery had developed in the early 1960s (appendix A10b). FAC consisted of several sub-directorates: production, human resources, and technology. The FAC staff in 1974 consisted of: shore workers (153 persons), fleet officials (357 persons), technical specialists (16

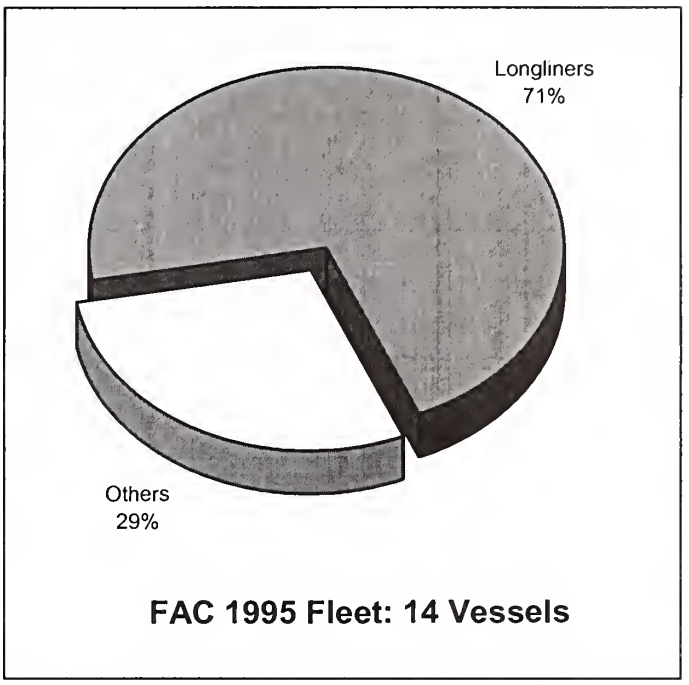


Figure 60.--The FAC fleet in the 1990s consisted mostly of longliners, but also a purseseiner, tanker, service vessel, and tug. By 1995, many of the longliners were inactive.

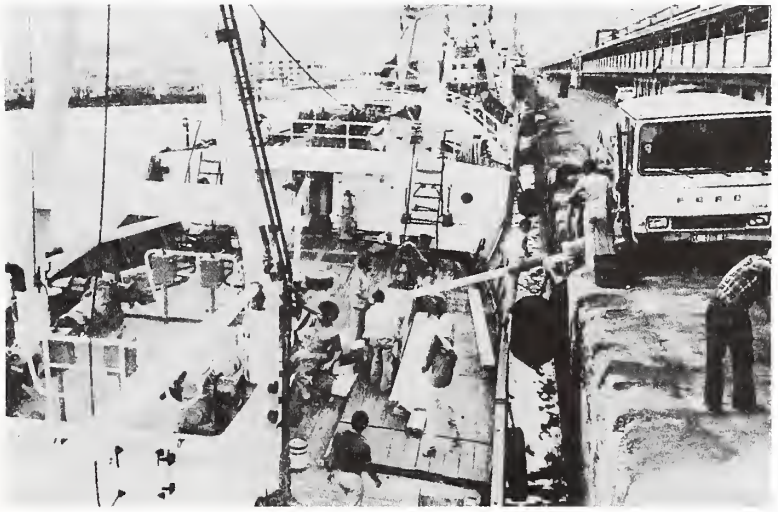


Photo 46.--The Flota Atunera de Cuba (FAC) operated Cuba's large fleet of commercial longliners and single purseseiner. Much of the catch, except for the shark, was exported.

persons), and master seamen (670 persons). FAC in 1974, more than a decade after the commercial longline fishery was launched, still had foreign, Japanese and Spanish technicians (56 persons).[901] The FAC staff by 1982 had risen to 1,800 crew members and shore-based personnel. Notably while the staff had grown, FAC's production in 1982 was not significantly above levels in the 1970s.[902] The inability of the Cuban longline fishery to meet the initial fleet production projections is one of several indicators that the longline fleet was not profitable (appendix A10b).[903] The fact that catches were constant while FAC was adding staff suggests that losses associated with FAC operations were increasing. While FAC appears to have operated at a deficit, Cuban media constantly proclaimed how FAC consistently exceeded operating plan goals (appendix A6b).[904] The FAC fleet consisted of primarily of longliners, but included one purse seiner, tankers, service vessels, and a tug as well as the staff at two base ports, Las Palmas and Havana.[905] One 1995 report indicated that the FAC fleet consisted of 10 longliners, a tanker, service vessel, and tug (appendix A3b). Many of the FAC longliners by 1995, however, were idled (appendix A4c). FAC personnel was severely reduced after the fleet curtailed activities in the early 1990s. Cuban reports indicate that maintaining the aging longline fleet by the 1990s was becoming increasingly difficult. FAC simply did not have the money to maintain the vessels or purchase new ones. During the Período Especial, FAC could not even meet its payrolls. Other problems such as fuel costs and declining catches and earnings added to FAC's problems. The decision to terminate FAC's fleet operations was based on both the Cuban economic situation in 1996 and the deteriorating state of the aging longliners. The Cuban economy was just emerging from a serious recession. Substantial sums would have been required to carry out needed repairs on the fleet. Cuban officials decided that the cost was not justified based on potential returns.[906] Current reports from Cuba indicate that FAC fleet operations essentially ceased in 1996.[907] FAC was apparently not closed entirely and maintained a small office in MIP. FAC ceased operating fishing vessels in 1996, some activity has continued with a skeleton staff.[908] Most of FAC's employees were left without jobs by the mid 1990s. A new company, AGECREW, was created in 1996 to find jobs on foreign fishing boats for former FAC and FCP employees.[909] The longliners were to big to deploy in Cuban waters and thus the Cuban Government decided to sell them. Most of the vessels probably had to be scrapped. Bermuda sources report leasing the longliner *Jurel*, from FAC in 1998-99.[910] MIP reports that as of late 2000 most of the Cuban longliners had been sold, primarily to foreign buyers.[911] Another source indicated that 4-5 longliners remained unsold, but that they were not active.[912]

Flota Cubana de Pesca (FCP): FCP, the Cuban state high-seas fishing fleet, was created June 1, 1962.[913] At the time of its creation, FCP consisted of a small steel boat (*El Guanahacabiles*), a dredger, and a repair shop for fishing gear.[914] The first important acquisition of new vessels were tuna longliners, mostly vessels acquired in Japan and Spain.[915] The longliners and Cuba's sole tuna purse seiner were transferred to the FAC in 1973-74 and FCP focused primarily on distant-water trawling.[916] Cuban officials decided that the needs and operations of a longline and trawl fleet were so different that the two should be operated as separate units.[917] FCP proceeded to purchase a fleet of large factory trawlers. Vessels were acquired from the Soviet Union, East

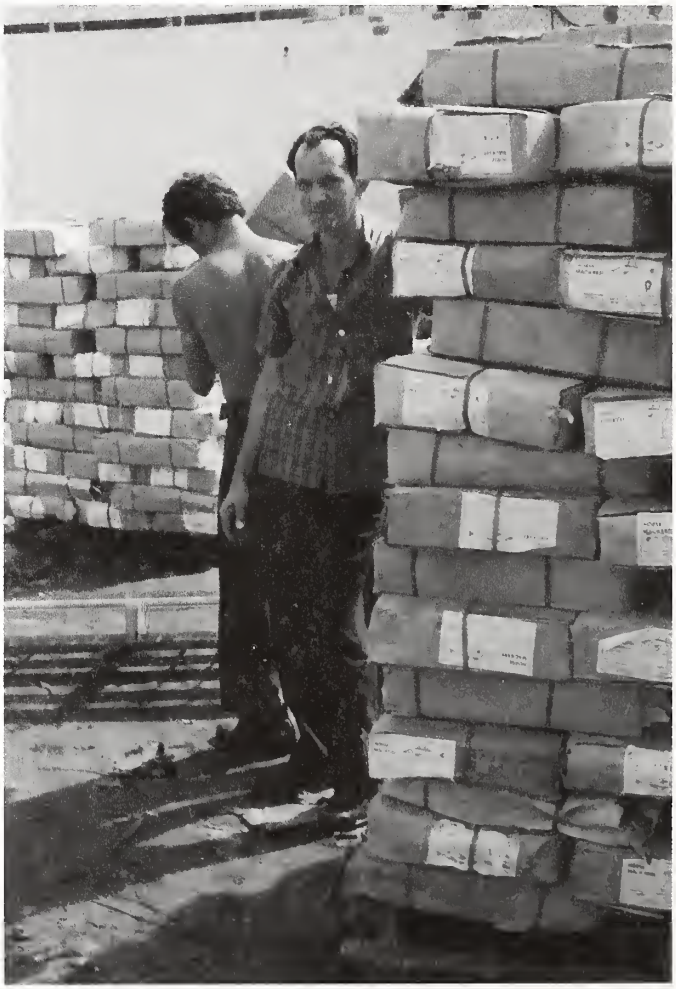


Photo 47.--The Flota Cubana de Pesca operated distant-water trawlers and during the 1970s-80s supplied large quantities of fish, like this horse mackerel, to the domestic market. D. Weidner

Germany and other countries, but the 31 largest vessels were the Río Damuji-class factory trawlers built at considerable cost in Spain. The operations were like FAC, dependent on Soviet fuel deliveries and during the Período Especial, most of the fleet was idled in Havana.[918] The vessels had been purchased to fish coastal banks for valuable demersal species off other countries, but by the time they were delivered, the anticipated grounds were closed to Cuba by the extended jurisdictions of coastal countries. The vessels were instead deployed on various high-seas grounds, often for low-value pelagic species. FCP never released any accounting of its operations to the public. A rough analysis of fleet operations suggest that like the Soviet fleet, the Cuban FCP was grossly inefficient and must have operated with sizeable losses (appendix A7). When Soviet subsidized oil was no longer available, Cuba could no longer continue to finance the massive deficits FCP was running. As a result, FCP had to terminate most of its operations.[919] FCP continues to operate a few trawlers off Canada and is now managed by PESPORT.

Flota de la Plataforma (FP): The FP consisted of the small coastal vessels that operated on the Cuban shelf. This fleet is now entirely managed by the APPs.[920]

Flota del Golfo (FG): The FG was primarily based in Havana. It operated quite a variety of different fisheries. The FG operated shrimp trawlers and other commercial vessels in the Gulf of Mexico and other Cuban coastal areas. It also operated longliners for grouper off Mexico's Campeche Bank. The FG also operated the artisanal longliners deployed in the swordfish fishery along Cuba's northwestern coast. The enterprises operating vessels under the FG included Boca de Jaruco, Cabañas, Cojímar, and Jaimanitas.[921] Most former FG vessels are now managed by PESPORT. Artisanal operations like the small longliners would have presumably been turned over to the appropriate APP.

Grupo Caribe: Grupo Caribe is a subsidiary of CARIBEX. It is responsible for marketing Cuban seafood in the Caribbean and Latin America.[922] No information is available on the success of such marketing efforts.

INDIPES: INDIPES is the MIP dependency which processes seafood and markets it in the domestic Cuban market. It operates plants producing fresh, frozen, canned, and smoked products. Products made from the longline catch include fresh and frozen fish, canned tuna, shark fins, smoked billfish, and shark liver oil. (See "Processing") INDIPES operates refrigerated trucks and the chain of Copmar and Mercomar retail stores as well as the Don Congrejo tourist restaurant in Havana. The company also manufactures metal containers, makes ice, offers freezing services, and provides a variety of food services.[923] The principal marketing agent for Indipes on the Cuban domestic market is Pesca Caribe. INDIPES marketing activities as described in internet postings sound impressive. Other Cuban reports, however, suggest that seafood supplies on the Cuban domestic market are very scarce.[924] See "El Submarino" for details on what an INDIPES store is like.

Jaimanitas: This is one of the fisheries establishments or cooperatives that were conducting the artisanal longline fishery for swordfish and billfish along the northwestern coast through the 1980s. Cuban publications vary in how they refer to this enterprise, but the proper name appears to be the Cooperativa Pesquera de Jaimanitas. The authors do not know the current status of this enterprise.[925]

MARPESCA: MARPESCA is the amalgamation of CUBAPESCA and MARPORT. It is the exclusive Cuban entity authorized to import equipment for Cuban fishing and merchant vessels and for ports.[926]

MERCOMAR: MERCOMAR is a subsidiary of INDIPES which groups together fish stores all over Cuba. MERCOMAR sells high-quality fish at "market prices".[927] The company has 22 "free" retail which sell "at least" 15 different products at market prices.[928]

Pesca Brava: This is reportedly a Cuban company marketing seafood in Spain. A 1984 report

Photo 48.--Cuban seafood processing plants, like this shrimp packing plant in Cienfuegos, were once operated by combinados pesqueros, but are now operated by the provincial fishery associations.

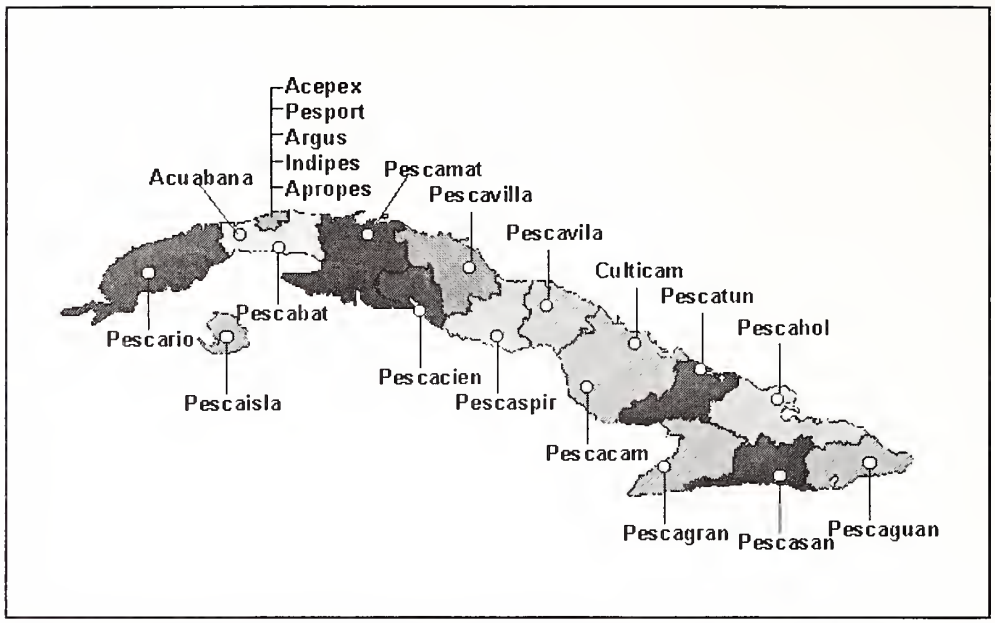


Figure 61.--MIPES now has a provincial fishing association in each Cuban province. Also shown are specialized state companies dealing with aquaculture, vessels, and purchasing.

indicated that it was marketing Caribbean lobster and squid.

Pesca Caribe: Pesca Caribe is a wholesaler which describes itself as the exclusive distributor of Cuban seafood in the Cuban domestic market. Pesca Caribe is a subsidiary of INDIPES. The company markets a wide variety of species, including longline-caught fish like swordfish, marlin, dorado, and shark. Frozen products include "bandas" of swordfish, sailfish, marlin, tuna, and batea shark. Canned products include a variety of tuna in oil packs and fried bonito. The company also imports seafood, including dorado fillets, to supply tourist hotels and restaurants.[929] Given the products described, Pesca Caribe sounds like they handle high-priced seafood distributed through hotels and restaurants and probably dollar stores. Most of their product line does not seem to be products available to individual Cubans without access to dollars.

Pescario: Pescario is the western-most APP for Pinar del Rio Province. This APP may be the primary one operating artisanal longliners for swordfish and billfish off Cuba's northwestern coast. Pescabat and other APPs may also operate small numbers. The authors at this time, however, have no details on the operations of individual APPs.

Pescatún: This is one of the APPs. It is located in Manatí along Cuba's northeast coast. Given the name of the company, one would assume that it is involved with tuna, but it is apparently named after the province--Las Tunas which in Spanish is unrelated to tuna. The authors have been unable to obtain any details about the association.

PESPORT: PESPORT appears to be a relatively new Cuban company. Promotional material in 1999 explained that the company is a conglomerate involved with operating fishing vessels, cold stores, shipping, maintenance and supply services, legal services, maritime and harbor services, fishing gear manufacture and repair, and a variety of other services.[930] Companies involved with PESPORT are Dragnets which operate highseas trawlers and Nexus Reefer which operate refrigerated cargo vessels.[931] PESPORT manages FCP, FG, and the remaining assets of FAC.

Provincial Fishing Associations (APPs): Provincial or producer fishing associations now operate virtually all of Cuba's fishing fleet, with the exception of a few distant-water vessels which are now operated by PESPORT. There are 15 APPs incorporating 37 fishing units.[932] There is one APP for each of Cuba's provinces and the Isla de Juventud (Isla de Pinos)--a special municipal jurisdiction off the southwestern coast in the Gulf of Batabano (figure 61). Most of the APPs have their own processing plants. There are significant differences in the size and importance of these APPs. One report indicated that four of the APPs provide about 50 percent of the coastal catch.[933] The APPs like the productive units they replaced are state-owned entities administered by MIP (figures 59 and 61). The APPs have replaced the cooperatives and combinados which once conducted coastal fisheries. As part of Cuba's economic reforms, the APPs have been given unprecedented autonomy in Cuban terms, however, fishermen in a market economy would find the Cuban system very restrictive. Each vessel operated by a APP has a prescribed budget and quota. The quota in fact a minimum catch requirement, not a limitation. Product landed in excess of the quota can generate bonuses above the basic salary. Crews which do not meet their quotas can be expelled by the association. Details in association management and bonus payments are still being developed by MIP. The idea behind the APPs is to make the individual crews responsible for efficiently

using fuel and supplies as well as maintenance and for production levels. As funds for supplies, fuel, and repairs come out of crew earnings, MIP is hopeful that APP members will give increased attention to operating efficiencies. Thus a crew that does not efficiently use its fuel or maintain its boats will have to pay out of their earnings. A 1987 report indicated that only four enterprises (Boca de Jaruco, Cojímar, Cabañas, and Jaimanitas) were still active along the northwest coast where artisanal longliners had been deployed for swordfish and billfish. All four, at the time, were operating small boats in association with the Flota del Golfo (FG). Based on the provincial organization of the APPs, these longliners are probably operating as part of either Pescario or Pescabat APPs (figure 61). Some associations are experimenting with quasi-property rights for members with crews being assigned specific areas within the associations operational region. The Batabano Fishing Association (Pescabat) is experimenting with this system for lobster fishing.[934] Cuban officials are hopeful that operating structure will foment sustainable fishing practices as well as improve operational efficiency. Reserved areas as of 2001 are limited only to the APPs taking lobster and shrimp.[935] This system would appear, however, to be less applicable for pelagic fisheries. Most of the APPs are not restricted as to where they can fish, although this issued is being examined by MIP. Each captain and crew currently decides how, when, and where they will fish. The crews and APPs do not, however, have the ability to sell their catch at market prices to buyers they choose. Their catch has to be sold to a single government purchaser (ACEPEX) at set prices.

Servicio de Consulta Maritima: The SCM is a subsidiary of AGECREW. It offers consulting services to foreign and domestic clients. Many unemployed FCP and FAC employees have extensive experiences and AGECREWS finds potential clients in need of technical assistance. AGECREW spokesmen are currently involved in staffing aquaculture projects.[936] The authors are unsure to what extent former FCP or FAC employees are being used in the aquaculture projects, but aquaculture has become a major priority for Cuban fisheries development.

(El) Submarino: El Submarino was a fish store ("pescadería") in Santi Spiritus. It appears to be one of the many shops operated by INDIPES. We mention it here as an indication of what these shops are like. The shop had a long list of available species (photo 29), including many species like swordfish and tuna which are taken by longlines. A visitor in 1993 attempted to buy fish in the morning , but was told that a afternoon shipment was expected. This may have been true or a convenient way of explaining the lack of fish in a fish store to a foreigner. The visitor believes that it was a dollar store, but there was no outward indication of this.[937] More recent visitors to Cuba report that a good selection of seafood is widely available in dollar stores and pesos stores offering product at market prices.

XII. Markets

A. Domestic

Cuba before the Revolution did not have a well developed fisheries market. Despite being an island nation, seafood consumption was relatively low and seafood was not especially popular. Havana was well-supplied with seafood. The two Havana commercial markets were stocked with an extraordinary variety of species.[938] Historical statistics probably understate consumption levels because of the importance of subsistence fishing. Cuban market trends followed a similar pattern as that generally noted in many other Latin America countries where beef was more popular than seafood. Pork and chicken were particularly popular in Cuba. Distribution systems in Cuba and elsewhere in Latin America were inefficient. Frozen fish was particularly suspect by consumers. Ironically one of the most popular seafoods was imported *bacalao*, salt cod. This changed with the Revolution and resulting increases in fish production. Cubans were told that it was their patriotic duty to eat fish produced domestically. A nation-wide program was launched to promote fish. School children and factory workers were given free fish lunches. Promotional campaigns provided information on the nutritional benefits of fish and were provided creative ways of preparing fish meals.[939]

The emphasis given to fisheries development has increased the quantity of fish delivered to the domestic market (appendix D2b). Most of the increased supply was low-value species from distant-water fisheries. This could be bought at low prices during the 1970s-80s and was not rationed.[940] Cuba's distant-water fishery in the 1980s supplied substantial quantities of fish to the domestic market. Much of it was jack mackerel, a species of limited appeal to Cuban consumers, but fish was widely available in the 1980s. Given shortages of meat and other protein foods, the distant-water fleet made an important contribution to domestic food supplies. FAO estimates that seafood consumption levels were 18-21 kg per capita during the 1980s (appendix D2).

Fish supplies peaked at nearly 21 kg per capita in 1988 and then declined as the Soviet Union began curtailing subsidized oil deliveries. After the Russians terminated subsidized oil deliveries altogether, the supply of seafood dropped to only 11 kg in 1994, only about half the level of the late 1980s (appendix D2b). As a result, of the withdrawal of Soviet fuel and plummeting production, fish in the 1990s had to be added to the long list of rationed goods.

Food is strictly rationed in Cuba. Rationing on many commodities was initiated in the early 1960s. Rationing is somewhat of a misnomer. An individual is theoretically not limited to the rationed amount, although in practice low salaries mean that substantial supplemental purchases are often not possible. The rationing system entitles each Cuban to a basic allotment of food at low prices.[941] Not all the rationed items, however, are always available. Fish in the 1990s was reportedly often not available at all. One 2000 report indicated that fish was often just available to individuals with medically prescribed diets.[942] When rationed fish does appear in Cuban markets, it is always frozen fish. The actual ration is based on salary and number and age of family members.[943] Cubans, including children, receive a ration book ("cartilla" or "libreta") each month with the family's allotment. This allows for the purchase of food and other supplies at Government subsidized prices (appendix D1).

Food rationing in Cuba is viewed differently by various observers.

Government: The Government contends that rationing guarantees every Cuban, regardless of income, his or her basic necessities. Officials point out that many low-income individuals in other Latin Americans can not afford the food provided each Cuban in the monthly food ration.

Critics: Critics of the Government see food rationing in a rich agricultural country like Cuba as evidence of failed economic policies.

Cuban seafood consumption, despite the rationing, is still well above pre-Revolutionary levels. Cuban officials would say that the rationing system insures a basic supply to the entire population. The variety of seafood available to the general population, however, is very limited unless the individual has access to dollars. Current Cuban markets are in sharp contrast to the variety of product available to consumers before the Revolution.

Food in Cuba is now widely available at market prices, but the average Cuban can not afford many purchases at stores with non-rationed product at market prices. The average Cuban monthly salary was about 220 pesos in 1999. Salaries may range about 100 pesos a month to 350 pesos for a college professor. University graduates are guaranteed a salary of at least 195 pesos. Some particularly eminent individuals like

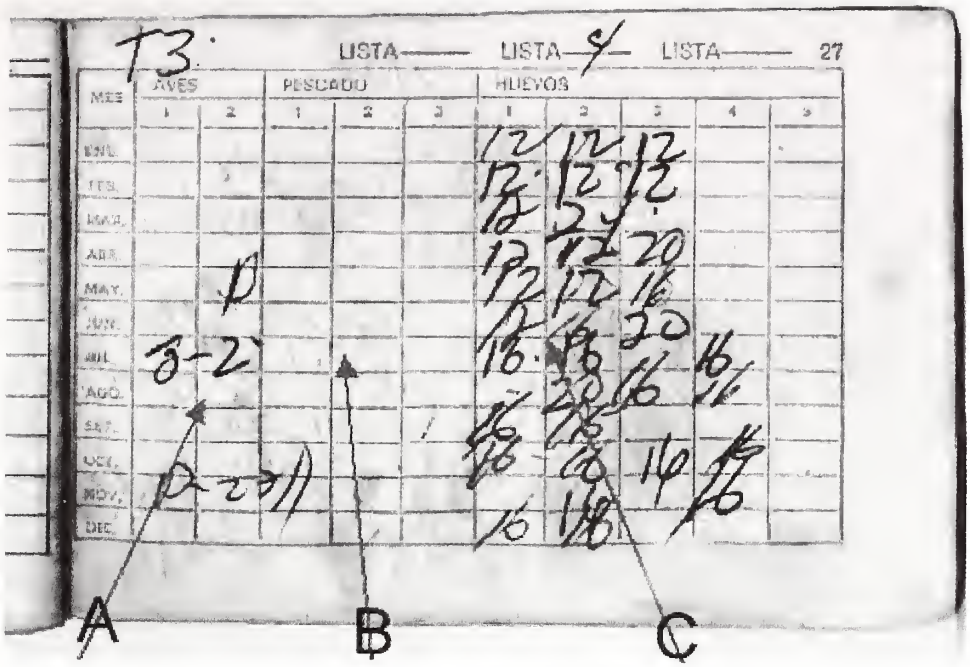


Photo 49.--Cubans have ration books ("libretas") recording purchases of rationed goods. Items are often unavailable. Note that the B columns for fish ("pescado") are blank.

a top surgeon may earn as much as 600 pesos per month.[944] The Government controlled exchange rate was about 21 pesos to the U.S. dollar. Non-rationed fish may sell at about 25 pesos per pound. One pound of non-rationed fish in government stores would thus be over 10 percent of the average Cuban's monthly salary.[945] The Government provides subsidized housing, free education, and free medical care, but still wages do not permit the purchase of much food in the free market, given the prices in peso terms.[946]

Some Cubans have access to foreign currency. Many Cubans have relatives living in the United States or other foreign countries. Other Cubans have jobs in the tourist sector or other areas where foreign companies are involved. The Cuban Government estimated in 1998 that about 1 million Cuban workers have access to U.S. dollars.[947] That number in 2001 is probably substantially higher, but the authors have no authoritative estimate. The workers with greatest access to dollars are those employed by foreign companies or workers receiving some of their compensation in dollars. There are also large numbers of Cubans who receive dollar remittances from relatives in the United States.

Fish has been one of the principal protein foods available to Cuban consumers. Beef has not been available in quantity to consumers for years. Most cattle are on dairy ranches and their output only is sufficient to provide small quantities of milk for children through age 6 years. Chicken and pork is available only in strictly rationed quantities. Chicken was once widely available, but production is only one-fourth of 1989 levels because Cuba cannot afford to import feed. For the same reason, pork production is one-third of 1989 levels. Fish was in the 1980s much more available than is currently the case. FCP was in the 1980s producing large quantities of frozen fish. The end of the Soviet oil subsidy, however, forced FCP to cease much of its distant-water operations. Cuban catches plummeted (appendices C1a2a-b) significantly reducing the domestic supply. The availability of fish in domestic markets, as a result, has plummeted. Some of the shortfall has been replaced with expanded aquaculture production. The fish ration in 1999 varied from 1-2 pounds monthly (appendix D1). The rationed amounts, however, because of the supply shortages are not always available.

Cuban Government sources claim that domestic seafood consumption totals about 125,000 tons (live-weight). Although that Government estimate was not dated, it presumably refers to 1997. This would approximately match apparent Cuban fishery catches and aquaculture harvests (appendix C1a2b).[948] Actual consumption would of course be substantially less. More recent Cuban new releases provide higher estimates of 150,000 t, but these high estimates are not confirmed by available catch data.[949] Available catch data suggests a combined fisheries catch and aquaculture harvest of only about 100,000 t in 1998, making a 1999 production level of 150,000 t unlikely. The per capita supply of fish appears to have peaked at about 20.7 kg in 1988 and then fell to only 11.3 kg in 1994. Supply has since recovered slightly to 12.6 kg in 1997 (appendix D2).

Seafood in Cuba is marketed through the following outlets:

Central markets: Fish is sold at the butchery ("carnicería") in the old central markets in most Cuban cities and towns. Very limited quantities of meat are

available at these butcheries. Beef is especially scarce and only available for children. Seafood is also sold at these butcheries. Only frozen fish is available there. Fish only appears about once or twice a month. Another source indicates that it is rarely available.[950] The authors do not have detailed information on the species involved.[951] This is where the rationed fish is purchased (appendix D). Prices run about P0.50-2.00 per pound for the rationed allotment.

Pescaderías: Seafood is also marketed through specialized fish stores ("pescaderías"). The stores are believed to be run by INDIPES. One 1999 report indicated that there were 107 fish stores "pescaderías modelos" that sell 5,100 t (product-weight) of fish provided by 20 suppliers.[952] It is unclear if pescaderías modelos were special shops and there were additional regular stores or if "modelo" was just a florid way of describing the stores. The quantity of fish sold through these stores seems to be only a small part of domestic consumption--even after the live-weight equivalent of the processed product is calculated. The pescaderías offer both fresh and canned fish. Fish at these stores is not rationed, but prices are set at market rates. They can thus be quite high given the low Cuban salaries. Dorado in 2000, for example, was selling at P25 per pound.[953]

Shopins: Government supermarkets called "shopins" are new in Cuba. The same species of fish found in pescaderías can be found at the new shopins. Two of the larger ones in Havana are Arenas Modas and Trópico. They offer fresh fish which the Cuban consumer prefers. It has to be paid for, however, in U.S. dollars to which many Cubans do not have access. Prices are also market prices and are comparable to the peso prices at the pescaderías calculated at about 1 dollar for 21 pesos. A wide variety of products are available in these stores, including U.S. products imported from Panama.[954]

INDIPES: INDIPES operates two chains of retail fish stores, Copmar and Mercomar.

Copmar: Copmar distributes rationed seafood products at fixed prices. They handle about 3,500 t of seafood monthly. The fish is available to the general public and priority institutions in Havana.

Mercomar: Mercomar operates "free" fish stores with locations throughout Cuba. The term "free" stores mean that the seafood is not rationed and sells at market prices. Mercomar in 1999 had 22 retail outlets offering at least 15 different products and 5.5 t of seafood daily.[955]

Del Mar: The Cuban state company, Del Mar, in late 1995 opened six new outlets in Havana selling luxury seafood including tuna, swordfish and marlin. Markets were also opened in provincial cities and more are planned for the future. The prices at these markets for oceanic pelagics (tuna, swordfish, and marlin) are relatively high, 55-90 pesos per kg for fillets. The Government has indicated in press releases that the new markets are designed to provide some needed income for the country's moribund fishing industry.[956] Prices at the new Del Mar markets are even more expensive than those on the black market where these species are sometimes available for 45-65 pesos per kilogram. It is unclear where the black market supply originates. Cubans can obtain licenses to fish for their own consumption. Many such fishermen, with or without a license, sell at least part of their catch door to door. Cuba's flourishing restaurants opened in private homes ("paladares") often serve marlin, swordfish, and other hard to get luxury species. Such species, however, are unlikely to be taken by small-scale fishermen, but probably obtained through the black market from state fishing companies.

Agricultural markets: As part of Cuba's market reforms, larger quantities of produce are moving through the

Photo 50.--The Pescadería "La Tarraya" is located in Guanabacoa. It is typical of the small retail outlets for fish located throughout Cuba.

Photo 51.--Cuba has one of the world's largest lobster fishery. Cuban consumers, however, can not buy lobster unless they have dollars. The catch is exported or sold in domestic dollar stores.

country's agricultural markets. Individuals raising crops can sell produce there. It once was illegal to sell even a single fish. Currently a few fish are sometimes available in these markets, although such sales are still theoretically illegal. This may be fish that individuals had caught from small boats, inner tubes, or along the shore.[957] Individuals may also try to sell a few fish along the roadside. Cuban processing plants have high quality standards. The fish in the free markets has been caught and handled under poor conditions and without ice. There is the additional problem of ciguatera.

Luxury seafood such as lobster and shrimp are virtually never available in Cuban markets for purchase with pesos.[958] Cuba generally exported most of its production of popular species to the important world markets, with the exception of the United States. Cuba exported, for example, most of its export-grade tuna and swordfish catch that was once taken by FAC longliners. With the growth of the tourist industry in Cuba during recent years, hard currency outlets have emerged in the domestic market. One MIP source reported in 1995 that the principal market for tuna has become "exportación en frontera" or tourist hotels and restaurants for foreign tourists paying in hard currency as well as "dollar" stores. One of the state owned operations, for example, is the Don Congrejo in Havana which specializes in crab and stresses that it is a tourist restaurant. Some extremely small quantities of exportable luxury product is also destined for "consumo nacional," mostly state-owned restaurants, hospitals, and party cadres.[959] Information is not available specifically on swordfish, but it probably follows the same pattern as for tuna. Some luxury seafood, including tuna and swordfish, has also been available on the black market, but at high prices. Fish and shellfish is sold on the black market.[960]

Cuban observers report that only limited quantities of seafood have been available in Cuba during 2000. Fresh fish at affordable prices is almost never seen. Most of the fish that is available is frozen fish or Chilean canned fish. Some fresh fish is available at high prices in free markets. Few Cubans can afford this fish unless they have access to dollars. Cuban fishermen as part of their salary may receive some of their catch. This fish is probably sometimes sold by the fishermen, although such sales are illegal. High quality seafood is also available at hotels and restaurants although again dollars are usually needed.[961]

Cuban officials are sensitive to the fact that Government policy has been to export the best quality seafood or to market it through domestic dollar stores or since 1998 peso stores at "market prices" where few Cuban consumers can afford to purchase it. The official response is that the foreign exchange earnings from lobster and other luxury commodities permit Cuba to import larger quantities of food for the general benefit of the population as a whole. Cuban Fisheries Minister Jorge Fernandez Cuervo describes the policy of exporting shrimp and lobster as "to use the high value of these products to obtain the high-protein foods that are needed by our country."[962] Some of the earnings are used to import lower-cost seafood, mostly frozen fish, but beginning in 1998 some quantity of Chilean canned fish. In recent years the balance of fishery shipments has ranged from about 19,000 t (1997) to over 40,000 t (1995) (appendix E1b). Only a small fraction of export earnings, however, are used to finance these seafood imports, about 17-24 percent in recent years. Officials often stress the importation of milk for young children.[963] Another Cuban

Fisheries Minister, Orlando Rodriguez Romay, also indicated that the fishery export earnings are used to finance the importation of needed food commodities such as powdered milk, cereals, rice, and beans.[964] No data is available on the quantities of such purchases. A substantial, but unknown portion of the foreign exchange earnings are needed to finance the foreign currency costs of the fishing industry. The primary cost would be needed fuel imports which since 1992 and the dissolution of the Soviet Union have had to be purchased with hard currency at international prices.[965] Other hard currency costs are spare parts and the purchase of foreign-built fishing vessels.

The Cuban consumer must be somewhat confused. The Cuban press when it addresses the fishing industry is usually full of glowing reports on how production is increasing. Graphics almost always show an upward trend. Until the 1990s the press stressed expanded production, using data from distant-water fisheries. In the 1990s, the media has stressed expanded production at aquaculture facilities, improved product quality, and efficiencies achieved at different plants. The authors wonder what the Cuban consumer must think when he or she reads the glowing reports in the newspaper, but rarely finds fish of any kind available in the stores for peso purchases.

The authors stress that the frequent unavailability of fish in Cuban markets does not mean that consumption of fish is minimal in Cuba. Nor does it mean that consumption levels are far below that of other Caribbean countries. In fact, Cuban consumption levels appear to fall in a mid-range of representative Caribbean countries (appendix D2c).

This seeming contradiction between apparent Cuba shortages and the country's mid ranking in statistical comparisons of consumption levels is due to a variety of factors.

Institutional feeding programs: Cuba has a large number of institutional feeding programs in schools, factories, and cafeterias for Government employees. The quality of seafood available in these institutional cafeterias and the preparation, however, is often not very appetizing.[966] Large quantities of fish, however, are dispensed in these facilities.

Personal income: Just because fish is available in shops in other countries does not mean that it is widely consumed. Many low-income consumers in the Caribbean and other Latin American countries cannot afford any fish at all. Rationing in Cuba means that at least some fish is available to Cubans at all economic levels.

Data reliability: The FAO data used in these consumption comparisons are only rough estimates based on national submissions of varying validity. The precise data entries should be viewed with considerable caution.

Subsidies: One factor which should be considered in assessing the differences between countries is the significant Government subsidies given the fishing industry. The level of subsidies, primarily in the form of financing deficits at state corporations might have been expected to have resulted in consumption levels above the Caribbean average.

B. Trade

The FAC primarily focused on exportable species (tuna, swordfish and billfish) through the 1980s. Press reports indicated in the late 1970s that FAC produced over 1 million pesos in foreign exchange.[967] While the exact US dollar value is difficult to assess, 1 million pesos seems like a rather small return, considering the rather substantial investment in foreign currency and domestic resources that FAC represents.[968] Cuban longline fishermen from the beginning took a larger proportion of low-valued shark than had been anticipated. The FAC in the 1990s increasingly targeted sharks and billfish. This suggests that the FAC with a declining overall effort may have refocused more on the domestic market--although the actual reason for this shift is unknown.

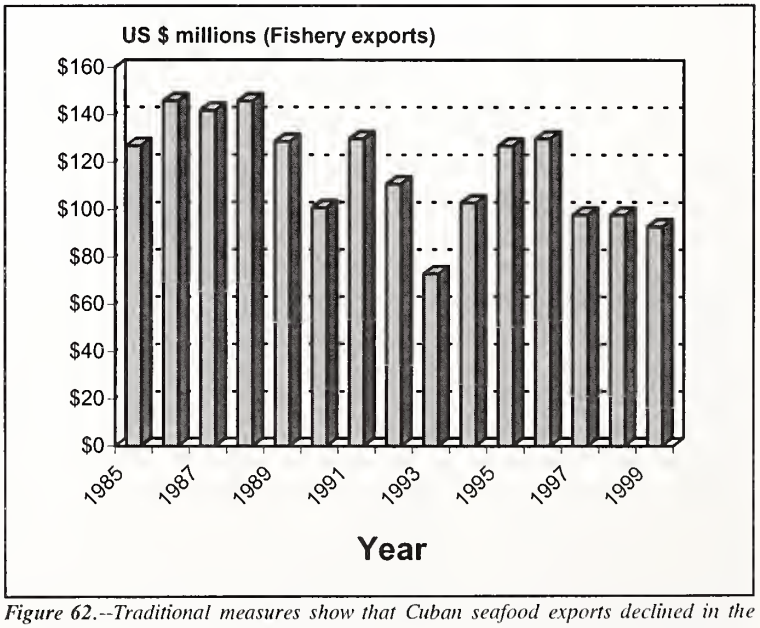


Figure 62.--Traditional measures show that Cuban seafood exports declined in the 1990s, but this doesn't include domestic sales in dollar stores which since 1993 have become increasingly important.

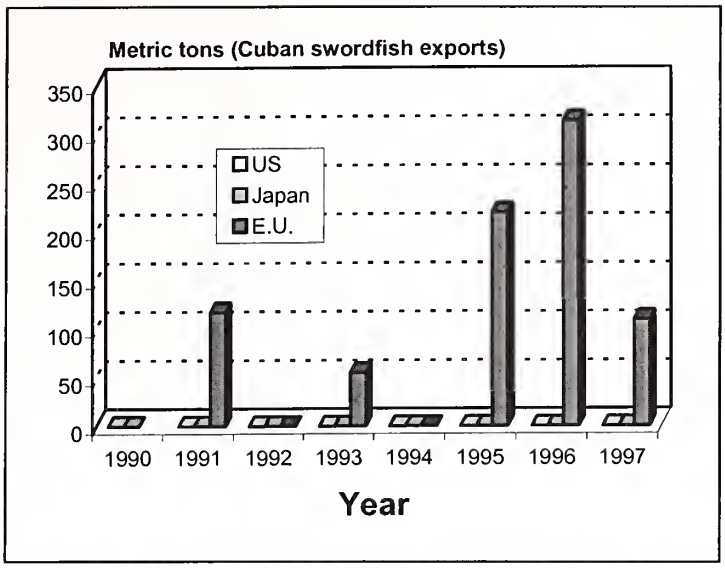


Figure 63.--The only country reporting Cuban exports of swordfish is EU member Spain. The 1997 shipments are unexplained as Cuba reported only a minimal catch.

1. Exports

Seafood exports have become an important export product. Much of the island's shrimp, lobster, tuna, and other valuable seafood products has been mostly exported rather than consumed domestically. In recent years the Cubans have marketed considerable quantities of high-value product at domestic dollar stores. The Cubans view this as a domestic export ("exportación en frontera").[969] Tuna and swordfish are no longer exported in significant quantities. Cuba in 2000 is promoting exports of cultured fish (tilapia and carp) that are being harvested by the country's expanding aquaculture industry.[970]

Cuban seafood exports declined sharply during the early 1990s, as part of the country's overall economic crisis. One of the major problems was the shortage of diesel fuel which adversely affected production. Seafood exports sank to only $73 million in 1993, some increases were reported in 1994-96, but the latest available data published by FAO Cuban Government, indicates that exports totaled only $98 million in 1997-98 (appendix E1a1). Cuban Government reports have noted larger amounts. Official Cuban data notes different, but not always larger, export shipments than reported by FAO (appendix E1a1). One Cuban Government internet site indicated shipments had reached $169 million.[971] Discrepancies between FAO data and export data released by the Government may in part be due to the fact that the Government sometimes includes dollar sales in domestic stores.[972] The validity of this statistical approach (classifying domestic dollar sales as exports) is a question requiring a sophisticated economic study far beyond the limitations of this report. The authors note, however, that some product that was once exported is now being sold domestically for dollars. This thus affects time-line comparisons of Cuban seafood exports because in earlier years domestic dollar sales were not classified as exports.

Cuba has exported a variety of seafood products, including swordfish and other pelagics. Cuban seafood exports, however, are composed primarily of lobster and to a lesser extent shrimp--both cultured and wild-caught shrimp (appendix E1a3). The proportion of lobster and shrimp has varied. Sine the 1970s it has been about 70 percent or higher. Export shipments in the 1990s have exceeded 95 percent shrimp and lobster. Exports of finfish have been limited. There were some substantial finfish exports during 1978-86 when exports exceeded $10 million. Shipments in 1980 totaled $31 million (appendix E1a2). It is unclear to the authors why export sales of finfish were so high during this period.

Cuba's principal market for seafood exports has been Japan Cuba through 1994 primarily exported to Japan. Swordfish appears to have been an exception to this as large quantities were exported to Europe, although Japan was also important. Since 1994, Europe has become an increasingly important market and in 1998 ranked as Cuba's primary market for seafood.[973] Swordfish is, however, no longer exported by Cuba.

The authors cannot at this time reasonably assess Cuban swordfish export trends. The Cuban Government has not published such data. The primary countries importing Cuban swordfish have been Spain and to lesser extent England. The authors do not have access to Spanish import data before they joined the EU. The Japanese data is difficult to use because until recently it has included swordfish in a basket category with billfish. The Spanish data could be developed, but time constraints on this project make this impossible.

Import data from principal swordfish consuming countries make an assessment of Cuban swordfish exports feasible only during the 1990s. The steadily declining effort, as aging FAC longliners were withdrawn from service, resulted in sharply lower swordfish exports during the 1990s. Precise trends are difficult to determine because Cuba does not publish detailed export statistics. The pattern of Cuban exports

is notable for the sharp fluctuations from year to year. Cuba's swordfish exports have been marketed in Europe, primarily Spain. Cuban tuna and swordfish export shipments have mostly been transshipped through Las Palmas.[974] The Cuban fleet began withdrawing from Las Palmas in 1987. It is unclear to the authors how tuna and swordfish was exported in the 1990s.

European Union: Cuba shipped nearly 120 t of swordfish to the EU in 1991.[975] Shipments have since fluctuated sharply, only 55 t in 1993 (appendix E2). Subsequent shipments have varied from nil (1994) to a high of 313 t in 1996, notably the last year of FAC fleet operations. There have been no Cuban swordfish exports to the EU since 1997. The principal EU market is Spain (appendix E3). Spanish reports indicate Cuba shipped 109 t of swordfish to Spain in 1997, all unprocessed frozen trunks.[976] Cuba is the only Caribbean country shipping significant quantities of swordfish to Spain.[977] Cuba's 1997 swordfish exports to Spain are unexplained as Cuba only caught 9 t of swordfish (appendix C8a). Notably, swordfish shipments to Spain have not been reported after 1997.

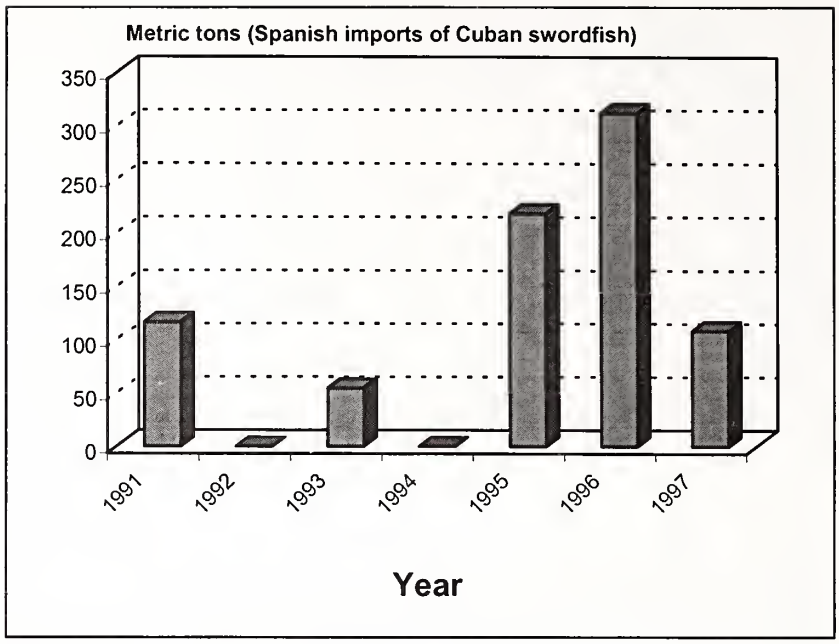


Figure 64.--EU data shows swordfish shipments from Cuba were highest in 1995-97 as the Cubans were winding down their commercial swordfish fishery.

Japan: Cuba ceased swordfish shipments to Japan in 1990. Substantial shipments, however, were reported during the 1980s when FAC was conducting extensive longline operations. Cuba shipped nearly 800 t of swordfish and billfish to Japan in 1986 (appendix E4a). The proportion of swordfish is unknown, but was probably about 280 t (appendix E4a). The Cuban shipments to Japan appear to have been made at substantial discounts to the prices received by neighboring countries for swordfish/billfish (appendix E4b). The authors do not know what caused this discrepancy. Several factors could be involved, such as differing species and product mixes.[978] There also could be variations in quality or a variety of other factors. The United States is the principal market for Caribbean swordfish. Cuba's inability to sell to the United States may affect the prices it receives for its product in other markets. Notably the difference appears to have disappeared, at least in 1989 (appendix E4b), the last year before Cuba ended billfish exports to Japan. Cuba has shipped no swordfish to Japan during the 1990s. The authors do not know why shipments were terminated at this time. The lack of available product could be one factor, although there were shipments to Spain. Shifting operations from Las Palmas back to Cuba could have been another factor. More important than swordfish, however, was the inability of Cuba to market FAC's tuna catch in Japan in any significant quantity. Cuban longliners were not equipped with ultra-low temperature freezers capable of producing the quality of product needed in Japan. As a result Cuban tuna

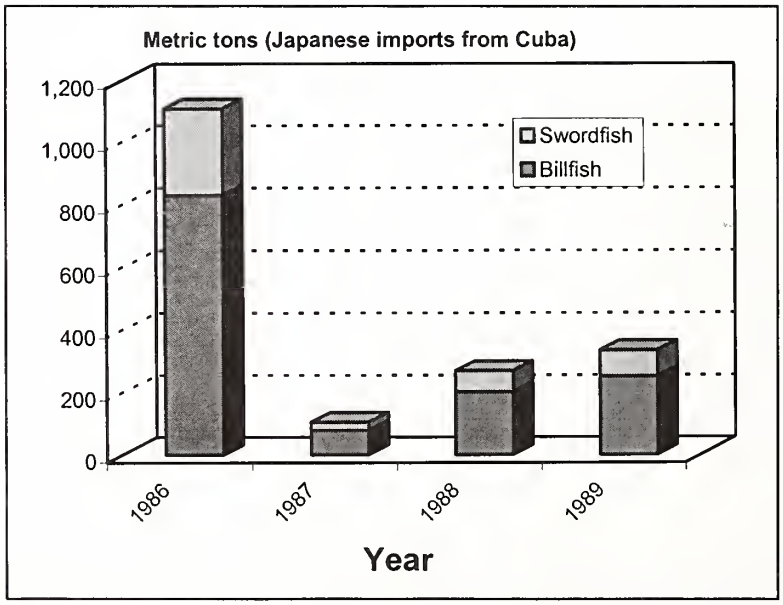


Figure 65.--Japan is Cuba's major market for seafood. There have been, however, no swordfish shipments during the 1990s.

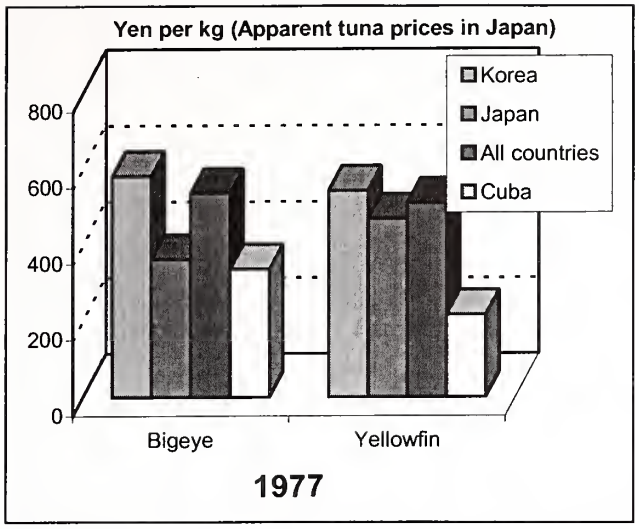


Figure 66.--Cuban tuna sold for much lower prices in Japan that that of the major Asian longline countries.

shipments sold for very low prices in Japan (appendix E4a). FAC officials determined that it would be too expensive to install such equipment on their longliners.[979] The Japanese during the 1980s were also interested in working with the Cubans on bluefin tuna. Some Japanese fishing was allowed, but Cuba officials apparently concluded that an operation to meet Japanese quality standards would be too costly to initiate.[980]

United States: Cuba does not export swordfish to the United States because of the U.S. trade embargo. This is a major factor affecting the swordfish fishery. Cuba can access strong markets for many seafood products in Europe and Japan. While swordfish can also be sold in other countries, demand for swordfish is not as wide spread as other Cuban fishery products like shrimp and lobster. The U.S. market for fresh swordfish is the largest and strongest market in the world. Thus the economics of the fishery is significantly affected by the U.S. embargo. Normally Cuba's location close to the United States would be an advantage if and when trade resumes between Cuba and the United States. The location in the case of the swordfish fishery is not as much as an advantage as one would assume. Cuba's commercial longline fishery was conducted in the eastern Atlantic off West Africa. (See "Grounds".) The catch was mostly frozen and a substantial quantity of the catch was not available for fresh shipment, significantly reducing he potential value. While the U.S. embargo prevents trade with Cuba at this time, some academic groups have assessed the potential of future trade relations, including fishery products. The most significant impact would be on Florida. Most assessments focus on lobster, shrimp, and reeffish like snapper.[981] Given the decline in the longline fishery, resumed trade relations would not have an immediate impact on Florida tuna and swordfish longline fisheries. Access to the U.S. market, however, could stimulate interest in Cuban in renewing some limited longline operations.

Mexico: Cuba and Mexico on May 5, 1998, agreed to create a joint-venture company, Pesca Caribe, to catch and market popular species of seafood. The seafood was to be marketed in tourist centers in the two countries. The seafood involved was lobster, shrimp, and other popular species.[982] This could potentially have been an export market outlet for swordfish and other species taken by Cuba's longline fleet, if it was still operating. Details on how this new joint venture is operating are not yet available.

2. Imports

Cuba does not import swordfish.

XIII. Government Policy

The Cuban agency responsible for fisheries is the Ministerio de la Industria Pesquera (MIP).

A. Law

The authors have few details on Cuban fishing laws and regulations. Until 1996, the last known set of fisheries regulations was issued in 1936.[983] After the Revolution, officials may have thought that regulations were not needed as all harvesting was conducted by state corporations or government-controlled cooperatives. In addition, much of the Cuban catch was taken on distant-water grounds. Cuban authorities issued a new law in 1996, Decreto Ley 164, reportedly initiated major changes in the country's fishing industry. One of the principal provisions of the law was an effort to decentralize the industry.[984]

B. MIP organization

The MIP organization is critical to understanding the Cuban fishing industry. Unlike the fisheries agency in most countries which is usually a regulatory agency, MIP is also the production unit because the fishing industry is state owned. MIP by the 1980s was composed of a myriad of agencies and enterprises which competed with each other and had a variety of supporting and conflicting interests. In addition to the regulatory governmental agencies, MIP was made up of enterprises engaged in fishing, farming, processing, marketing, shipbuilding, exporting, importing, and

other activities. MIP was organized vertically with 10 distinct management levels between the Minister and the actual production enterprises. According to one study, "The large number of subordinate enterprises and the excessive vertical integration complicated and slowed the entire management process. The ... structure made the systematic monitoring and controlling of the fishing industry virtually impossible."[985] Cuban officials determined that the organization of MIP was not appropriate for the new management direction contemplated in the reforms of the 1990s.[986]

MIP has carried out a wide-based reorganization during the 1990s. A new overall management structure was instituted. The most significant change was an effort to decentralize the daily operations of the harvesting or fishing sector. MIP sought to "... incorporate modern entrepreneurial techniques via more horizontal and flexible centralized structures--Associations." Asociaciones Pesqueras Provinciales (APPs) were created to bring "... decision making and responsibility closer to the point of production, thereby increasing the efficiency of the economic activities (i.e., fleet operations) related to fisheries harvest."[987] Details on the APPs and other state enterprises are available in "Companies".

The Government has made optimistic pronouncements concerning the results of the reforms. Production enterprises are reportedly operating profitably.[988] Scattered reports indicate a variety of efficiencies and production increases as a result of the steps toward decentralization. New labor contracts provide improved incentives. One particularly important development is improved fuel economy. Cuban sources claim that fuel utilization per ton of catch during the 1996-99 period has been reduced from 0.9 to 0.5 t which Cuban officials insist show that their efforts to cut operating costs and improve efficiencies are working.[989] Many of the reforms taken would seem to be helpful steps in creating a more profitable fishing industry. The question remains, however, as to whether a state-owned fishing industry, no matter how fine-tuned, will in the long run prove profitable and generate real economic benefits for the Cuban people.

C. Limits

Cuba declared a 12-mile Territorial Sea in 1977.[990] The country also declared a 200-mile Exclusive Economic Zone (EEZ) in 1977.[991] Marine boundary agreements have been signed with neighboring countries: Haiti (1978), Jamaica (1994), Mexico (1976), and the United States (1977). Cuba signed the Law of the Sea Convention with a declaration in 1982 and ratified it in 1984, again with a declaration.

D. Licenses

Cuba does not permit any significant number of foreign fishermen to operate in its waters other than recreational angling for billfish associated with local sports fishing tournaments. There has, however, been interest expressed by foreign fishermen and the authors have noted scattered reports of some limited foreign fishing. The U.S. Department of State reported in the late 1970s that Cuban was preparing foreign fishing regulations. It is unclear if they were ever promulgated.[992] Cuba has extensively developed its coastal fishing industry and Cuban fishermen are fully utilizing most available coastal fishery resources.[993]

The authors do not know of any fishing licenses issued to foreign fishermen, although information on Cuba is at best sketchy and the authors have no way of knowing if any such licenses have been issued. It is also possible that they have been issued and not publicized or officials just permit some limited foreign fishing without issuing licenses. Cuban officials are know, however, to have allowing some foreign fishing in Cuban waters.

Japan: Some Japanese fishing was reported in the 1980s.[994]

Taiwan: Taiwan longliners in the 1990s have been noted off Cuba in the same area as Cuban patrol boats.[995] In addition, a Filipino fishermen has reported working on a Taiwan owned longliner which was fishing just outside Havana harbor.[996]

United States: One former Cuban official reports that in the 1980s there were quasi-official arrangements between the Cuban Government and some U.S. longline fishermen.[997] U.S. longline fishermen are known in the 1990s to operate in or near the Yucatán Channel and Windward Passage. The Cubans appear to tolerate U.S. longlining as long as the U.S. fishermen do not enter Cuban territorial waters. (See: "XVI. International," for details.

E. Regulations

Many Cuban fisheries are now highly regulated. MIP imposes seasonal closures ("vedas") and a few permanent closures on species like turtles. The important lobster fishery is particularly closely managed with a closed season and gear regulations. The snapper fishery is also regulated.[998] There are, however, no Cuban regulations pertaining to the pelagic fishery for tunas, swordfish, and related species.[999]

The most significant management tool in Cuba is the limited entry system imposed by the Government's control of who fishes. Unlike most Caribbean islands, Cuba does not have an open access fishery.[1000] New entrants are not permitted unless they join existing regional producer associations. Officials appear to be permitting some limited fishing by small-scale private fishermen who have very small boats. The fishermen which the authors have noted all have sail-powered boats (photo 28). It is likely that the authorities do not permit outboards.

MIP has created a new office, the Oficina Nacional de Inspección Pesquera (ONIP), to enforce management regulations. The ONIP has 15 provincial offices and over 200 inspectors and specialists assigned on the basis of economic importance among the different provinces.[1001]

F. Fishermen

1. Organizations

The principal Cuban organizations for fishermen were cooperatives and a state controlled union. Increasingly regional producer associations, Asociaciones Provinciales Pesqueras, appear to have become more important. Regulations passed in 1994 subject Cuban companies, cooperatives, and producer associations to taxes.[1002]

Cooperatives: The Revolutionary Government began organizing artisanal fishermen into cooperatives from an early stage of the Revolution. Cuban reports of improved working conditions, safety, and the introduction of improved technology are probably accurate. The authors, however, know of no published assessment of Cuban fishery cooperatives. While Cuban fishery publications used to describe the benefits of cooperatives, they were by the 1980s rarely mentioned in the Cuban media.

Union: Cuban fishermen in the highseas fleets like FCP and FAC belonged to a Government-controlled union, the Sindicato Nacional de Trabajadores (SNT) Marina Mercante, Puertos, y Pesca. The union membership is made up of workers from the merchant marine, ports, and fishing industry. The union functions more as a state control mechanism, however, than a free trade union. Workers are not allowed to strike or organize other job actions which would disrupt production. Cuba, however, while a police state, is not a Stalinist state. The workers can use the SNT to submit grievances or make suggestion. These are tolerated as long as they do not rise to the political level.[1003] The authors know of no detailed study published on the union.

Producer associations: Cuban officials appear to have converted most cooperatives and some state enterprises into provincial fishing associations--APPs. Interestingly, where as the Cuban press once focused on how the cooperatives improved the life of Cuban fishermen, the media now is more likely to stress how all of the producer associations are profitable.[1004] This is an interesting shift for a socialist country. MIP is assessing the operations of the APPs which are still relatively new. The MIP is currently preparing a new integrated system of fisheries management and the APPs will play a major role in the new system. One of the many issues MIP is studying is that while the APPs are organized on a provincial basis, except for lobster and shrimp, there are no restrictions on where the vessels operate. Cuban officials report that more than four units currently operate in the same area simultaneously. This complicates stock assessments and the enforcement of management measures. Officials are also concerned that operating boats at distances from home ports also reduces some of the economic efficiencies that were anticipated when the APPs were established. The MIP is reportedly examining these and other issues in the preparation of the new management system.[1005]

2. Advisory Commission on Fishing

The Cuban Government, as part of the 1996 reforms, created the Advisory Commission on Fishing. The Commission consults with MIP on a wide range of fishery issues. The Commission has worked on protected areas, closed seasons, minimum sizes, recreational fishing, and a wide range of other matters.[1006] The authors do not know how the members are appointed and how well the interests of the fishermen are represented.

3. Training

Cuban officials launching a new distant-water longline fishery were faced with the problem that few Cubans had experience with longlining or in operating large distant-water fishing vessels. Initially during the 1960s when Cuba acquired their first commercial longliners, they arranged for training assistance from Japan. A substantial number of Japanese, Spanish, and other foreign technicians and master fishermen worked aboard Cuban longliners during the 1960s. Most of the foreign personnel on longliners were Japanese and they played a major role in training Cuban fishermen.[1007] A few Japanese fishing masters and technicians were present even in the 1970s. Cuban fishing techniques are thus heavily influenced by the Japanese.

MIP initiated an extensive program of youth education and adult education and crew training.

Cuban has the most extensive system of fisheries training in Latin America. Secondary and post-secondary level programs aim to qualify students for certificates awarded to ensure competence in a variety of maritime and fishery-related fields.

High school: The secondary level Escuela Secundaria de Pesca Adolfo Lopez Mateo has a curriculum especially geared to the fishing industry. The school was the major source of recruitment for the Cuban high seas fleets (FCP and FAC).

Technical school: The technical school Escuela Superior de Pesca Andres Gonzalez Lines is Cuba' highest level fisheries school at the secondary school level.[1008] The Escuela Superior now focuses primarily on adult education, enabling MIP employees to acquire technical skills, including pilot, radio navigator, electrical-mechanical repairman, marine engineer, fishery technicians, vessel captain, and other technical specialties.[1009]

Correspondence school: The FAC also encouraged its personnel to pursue academic training after they are hired. Programs were available that the fishermen can take at sea. This was particularly important for the FAC because longline trips were commonly 100 day or more. One Cuban report indicated in the early 1980s that quite a number of fishermen were involved in these programs, 499 in cultural programs and 247 in technical programs. The Ministry of Education offered more than 15 different technical programs (engine and deck officers, technicians, mechanics, cooks, nurses, and others).[1010] The FAC in the 1980s attempted to improve the academic level of its personnel. FAC reported that 946 fishermen had not yet completed a 9th grade education. FAC officials were attempting to fulfill a commitment that all workers complete the 9th grade by 1985. At sea courses were being used aboard FAC vessels.[1011]

Other: Other facilities include the Instituto Marítimo Portuario and the Centro de Preparación Acuícola de Mamposton.

President Castro has personally expressed great pride with the Government's achievements in building such schools.[1012] He has particularly noted the schools' reported success in preparing thousands of young people of humble origin, many the children of artisanal fishermen, for professional careers in a commercial fishing industry.[1013] MIP units, including the FAC, have developed programs to develop "interests circles," often Pioneer (virtually mandatory communist youth group) groups, in the fishing industry.[1014]

MIP also developed training programs that allowed fishermen to use spare time at sea to study for advancement. The training not only improved the skills of the fishermen, but provided opportunities for the fishermen to move into higher paying technical positions aboard the vessels. These courses were promoted by the various fishing fleets and awards were given for the level of participation. The FAC usually ranked high in the competitions between fleets, perhaps because of the length of the fishing trips and thus available free time at sea.

The future of the Cuba's fishery training schools, however, is unclear. The focus was initially on supplying trained personnel to operate large, commercial fishing vessels in distant waters. With the decline in distant-water operations discussed above (appendix C1a2b), Cuba no longer needs large numbers of trained technicians to operate vessels that have been tied up or sold. Many already trained individuals no longer have vessels to work on and are unemployed. Some are being contracted to work on foreign vessels, through AGECREW.[1015] The authors do not know to what extent the curriculum in Cuba's training schools is being adjusted to focus more on aquaculture and other areas that MIP is promoting.

4. Microbrigadas

FAC organized Microbrigadas to carry out useful social programs when the fishermen are on shore with no sea duties. Press reports indicated that 306 FAC fishermen participated in Microbrigadas during 1987. Projects include building houses, workshops, and other social functions.[1016] Participation is theoretically voluntary, but it would not be good for one's career to refuse to participate. The current status of the Micro Brigade Program is unknown.

G. Environmental protection

Pollution and other environmental concerns is an important issue, especially for a country which in recent years has decided to focus on coastal fisheries and aquaculture and in which tourism now plays such a vital role in the economy. As with many issues associated with Cuba, there are widely differing views on Cuba's environmental record.

Environmental problems: The authors have noted a variety of reports describing serious environmental problems in Cuba.[1017] Problems vary from pollution (especially sugar mills and mines), coastal development, aquaculture runoff, damming rivers, and poor water management. Cuba has built many dams in its rivers.[1018] Some like the Río Cauto have been dammed nearly up to its mouth. A more recent development has been the "riprap" bridges connecting offshore cays to the mainland.[1019] These dams and bridges have significantly changed water flow, affecting

nutrient transport, salinity, and other vital factors in the coastal wetlands that play an important role in the life cycle of aquatic organisms.[1020] Such changes can significantly affect the productivity of important Cuban fisheries as most of the important shelf species are dependent on the mangroves and other estuaraine habitats as breeding and nursery areas.[1021] The MIP and various observers are especially concerned about the impact of habitat degradation on the important shrimp fishery.[1022] Cuba's decision to reverse its policies toward tourism has resulted in increasing development of coastal areas and offshore cays.[1023] One area of special concern to many environmentalists is Cuba's desire to take hawksbill turtles and export turtle products. (See: "Bycatch: Turtles" below.)

Environmental protection: Other observers report that Cuba's development strategy places strict environmental controls on development. Foreign investment projects must include provisions for waste disposal and land use consistent with sustainable development.[1024] Interdisciplinary environmental assessments have been made in Cuba.[1025] CIP researchers report that the MIP, especially by the 1980s, was increasingly willing to accept and act on scientific advise on management issues even when it meant imposing strict regulatory measures.[1026] In this regard, the MIP in Cuba has the authority to quickly impose regulatory measures. As the MIP conducts the fisheries through the APPs, such regulations can be implemented quickly with a high level of compliance. Also, unlike fishery agencies in democratic countries, the MIP does not have to worry about legal action by affected fishermen. Other Government agencies, however, have been less willing to limit development projects affecting fisheries.[1027] This has included even major fisheries, like the shrimp fishery which is being affected by a variety of development projects.[1028]

Serious environmental problems developed in many other communist countries. While democratic countries also have serious environmental problems, the situation in the former Soviet Union and Eastern Europe appear to have been much more serious. This occurred because in a communist country the Government, which is responsible for environmental protection, is also the operator of major extractive and production industries. In essence it amounts to industrial self regulation. Managers confronted with a conflict of interest often showed a bias toward production as opposed to conservation and the environment. Environmental problems, even serious public health issues, were largely hushed up or down played the government-controlled press. The democratic governments taking power in Eastern Europe and Russian during the late 1980s and early 90s encountered environmental problems of staggering proportions. These countries face a wide range of environmental problems precisely because the former communist governments either refused to adopt, or enforce, environmental policies that would have required industries to devote significant resources to address environmental problems. These were largely seen as non-productive areas as thus in many cases simply ignored.[1029]

The status of the Cuban environment is not well known. The country's controlled press and prohibition of independent organizations, including labor and environmental groups, makes it difficult to obtain unbiased information. We do not know, as a result, to what extent the Russian/Eastern European environmental pattern is occurring in Cuba. Government officials are clearly attempting to deal with environmental issues.[1030] The choices are especially difficult for a country like Cuba with enormous financial problems and, because of the inefficient economy, has inadequate export earnings to cover even basic import needs. Cuban officials are aware of the problem created when a single entity, the state, is responsible for both production and regulation and are attempting to address it. Officials note that the tendency favoring production has been responsible for some overfishing.[1031] Other observers as noted above report that development outside the scope of the MIP is impairing important coastal resources and the MIP has not been able to limit much of this activity.[1032] Whether Cuba can more effectively regulate its own production units than was the case in the Soviet Union and Eastern Europe remains to be seen.

Cuban environmental problems do not appear as severe as in Eastern Europe, perhaps because of the less extensive industrial development in Cuba. Coastal areas in particular are not as developed in Cuba as in many Caribbean countries, in part because of the country's inefficient economy and, until recently, failure to promote a tourist industry. Some authors stress, however, that Cuba's opening to foreign investment in the 1990s has meant that the country has now began to develop coastal sites.[1033] The question remains to be answered as to how effectively Cuba will regulate the expanding coastal development.

XIV. Research

Cuban researchers have worked with swordfish and other oceanic pelagics, primarily focusing on tuna. Cuba and Soviet researchers briefly worked together on tunas during the early 1960s as both countries were preparing to launch a tuna longline fishery in tropical waters. Cuban researchers have also worked with both FAO and ICCAT on tuna and other oceanic pelagics. There has also been some bilateral cooperative efforts. Cuban research on oceanic pelagics has for a small Caribbean country with limited resources rather extensive. Cuba and Venezuela and to a lesser extent Mexico, are the only Caribbean countries that have conducted serious research on large pelagics. The principal focus of Cuba's fisheries research effort has understandably been on neuritic species of greater importance to the fishing industry.[1034] The Cubans have, however, conducted an impressive research program on large oceanic pelagics. The CIP has been the primary, but not the only Cuban research institute involved. Unfortunately, many of these studies have not been widely circulated outside of Cuba, with the exception of the papers published by ICCAT.[1035] Even more unfortunate is that quite a number of studies were never published at all.

Cuba's principal bilateral research partner beginning in the 1960s was the Soviet Union, but this relationship declined in the 1980s and essentially ended in the early 1990s. Cuban research collaboration with other countries would normally be oriented primarily to research institutes in Mexico and the United States which are working on many of the same species that occur off Cuba. In many cases they are even shared stocks. The Cubans do cooperate with Mexico. Research contacts with the United States are very limited, but some cooperation does occur.

USSR: Cuba and the Soviets cooperated on a wide range of fishery subjects. One part of that was tuna fishing because both Cuba and the Soviets in the early 1960s wanted to launch a tuna fishery. While the Soviets never did launch a serious tuna fishery, the Cubans did based in part on the early work with the Soviets. The Soviet-Cuban cooperation on tuna research was conducted on tropical grounds from West Africa to the Caribbean. Even more important for the Cubans was access to Soviet research on the distant-water grounds in which they launched trawl fisheries. Collaboration on research in Cuban waters was more limited, in part because the Soviets had little experience with the tropical species found in Cuba. There were, however, a few papers on tuna that were done jointly with Soviet researchers.[1036] The principal Soviet contribution here was assistance in training Cuban fishery biologists. By the late 1980s even before the dissolution of the Soviet Union, research cooperation with Soviet institutes had declined significantly.[1037] By this time Cuba had developed a competent research capability and as their distant-water fillet was being reduced, Cuban researchers were focusing on coastal species. At the same time, increasingly cash-starved Soviet research institutes had little interest in Cuba's tropical species.

Russia: Research cooperation with the Russians essentially ended with the dissolution of the Soviet Union at the end of 1991. The withdrawal of the Russian fleet from many highseas fisheries has meant that the Russian research effort has more narrowly focused on their own coastal waters. By the same token the decline of Cuban distant-water fisheries has more narrowly focused Cuban research on Caribbean coastal waters. The Russian Government was unwilling to fund cooperation with Cuba. Cuban research institutes for their part were unwilling to devote scarce hard currency to fund cooperation with Russia.[1038] Russian researchers have little expertise in the coastal species of interest to Cuba. The authors have no information on any current Russian-Cuban research cooperation which is probably limited to informal contacts between former colleagues.

Japan: Cuba has worked closely with Japanese specialists in developing its tuna fishery. Much of this was technicians working with the fleet rather than collaboration between researchers. The Cuban captains, however, are known to relied upon Japanese catch data in planning their fishing trips.

Mexico: Cuba and Mexico have a close fisheries relationship and meet annually to discuss fishery relations, including research cooperation. There are regular exchanges between Cuban and Mexican delegations. The authors have noted exchanges on aquaculture, lobster fishing, and several other coastal resources. We have not noted any cooperative efforts concerning tuna, billfish, and swordfish or longlining in general. Our information, however, is limited and this does not mean that cooperation with Mexico on these topics has not taken place. Mexican and Cuban researchers have worked together on sharks.

United States: The Cuban relationship with U.S. researchers is more complicated. U.S. researchers have done extensive work in the Atlantic off Florida and in the Gulf of Mexico on shared stocks, including work in waters adjacent to Cuba. Most of this work has been conducted independently of Cuban researchers because of the difficulties associated in working cooperatively with Cuba. Researchers in both the United States and Cuba, however, have shown an

interest in cooperative work. NMFS researchers have attended scientific meetings in Cuba.[1039] Despite the political differences between the two countries, there have been some collaborative work, primarily with U.S. academic and non-governmental research organizations. U.S. research vessels have been given permission to operate in Cuban waters and Cuban research vessels have worked in U.S. waters. Cuban and U.S. scientists have jointly been involved in these cruises. A few NMFS scientists have also reported some contacts with the Cuban counterparts.[1040] University researchers have also reported cooperative projects with Cuban research institutes.

Researchers in both Cuba and the United States have reported a variety of problems in pursuing fisheries research. In part this is a reflection of the difficulties Cuban scientists have communicating with any foreign scientist and difficulties in obtaining permission and funding for foreign study and conferences. There are, however, many special circumstances complicating cooperation between Cuban and U.S. researchers.

Security concerns: Cuban and United States officials in the 1960s and early 70s had a variety of security concerns. Cooperative research was virtually impossible during this period.

U.S. embargo: U.S. policies concerning the trade embargo and research exchanges have varied over the years. The current policy has to prevent any expenditure of U.S. funds in Cuba. This severely limits possible cooperation.

Cuban counterparts: Quite a number of U.S. researchers are interested in working in Cuban. In fact, there appear to be more U.S. scientists interested in working with Cuba than there are potential Cuban counterparts.[1041] In many countries it is not necessary for foreign researchers to have a local counterpart. Of course local counterparts are always an asset. In many cases, however, U.S. researchers, especially in developing countries, are working on subjects that are not of interest or beyond the capabilities of local researchers. In Cuba, research without a local counterpart bringing with it Cuban Government approval, is virtually impossible.

Cuban priorities: Cuban researchers report that many U.S. scientists are interested in pursuing studies that do not interest Cuban scientists and research institutes.[1042]

Limited funding: The economic crisis of the early 1990s resulted in funding cuts that have forced Cuban research institutes to severely curtail their efforts. This has limited potential cooperative projects with foreign researchers.

Communications: Communications between Cuba and the United States are difficult. Few Cuban researchers, because of the cost, can call researchers in the United States. Few Cuban researchers have desk top internet connections making e-mail communication difficult.[1043] Cuba has at times cut incoming telephone calls from the United States because of a dispute over U.S. payments to the Cuban telephone company.[1044] The authors' efforts to contact Cuban researchers have resulted in mixed responses. Some researchers and officials have been willing to talk openly. Some have asked that there names not be used. Other individuals have been hesitant to talk at all. Some researchers required clearances from the Cuban Foreign Ministry before engaging in even informal cooperative exchanges.[1045] Other U.S. researchers have had similar experiences. Often inquiries go unanswered leaving U.S. researchers uncertain as to what the difficulty might be.

Contacts: Cuban research groups coordinate a regular series of meetings and events to survey fishery developments. Only a limited number of Cuban researchers travel abroad. These meetings are thus one of the few opportunities for Cuban and foreign researchers to meet. Some of these events focus on research and others more on fishing industry issues. MarCuba'2000 was the 5th Congress of Marine Science.[1046] Pesca'2001 focused more on fisheries technology and industry matters.[1047] These events provide excellent opportunities for U.S. fisheries researchers to meet Cuban researchers and informally discuss the possibility of cooperative research projects.

A. Cuban research

Cuba has a competent, if under-funded, marine science establishment. One FAO assessment indicated that Cuba has a modest, but effective marine science capability.[1048] NMFS contacts with Cuban research institutes have been limited, but NMFS researchers have generally been impressed with the country's research effort, given the constraints under which it operates.[1049] Soviet support and scholarships have played an important role in developing the Cuban research capability. Much of Cuba's research capability has been created by the Cuban Government since the 1959 Revolution as part of the expanded emphasis on fisheries and marine affairs. One FAO report, for example, indicated that the Centro de Investigaciones Pesqueros (CIP) which had only 8 employees in 1960 had 330 employees in 1979, 93 with university degrees.[1050] Current staffing levels at the CIP are unknown, but are believed to have been substantially reduced.

Cuban fishery scientists face a variety of limitations. Cooperative science exchanges have been primarily with other communist countries, mostly the

Soviet Union, but also China, East Germany, North Korea, and Poland.[1051] Canadian scientists in 1996 reported that other than these exchanges with Soviet an Eastern European scientists, Cuban scientists have had only limited international contact with international expertise and little exposure to published materials.[1052] For this reason, FAO in its assistance program has funded study in foreign universities and attendance at international conferences.[1053] Resources available to Cuban researchers are very limited.[1054] Limited resources and equipment was a problem noted by FAO in a 1982 assessment of Cuban marine research.[1055] One U.S. scientist reported that many Cuban scientists do not have access to basic journals, computers, and other materials and databases which they need to be professionally active.[1056] Cuban researchers have found it difficult to obtain permission and funding for studies in other countries or to attend international conferences. Few researchers have access to long distance phone connections. Computers, especially those with internet connections that can be used for e-mail are limited.

Despite the difficulties under which Cuban researchers worked, the output of the small group of energetic Cuban researchers working on large pelagics was notable. Quite a number of valuable reports were published during the 1970s and 80s which provided information on both the artisanal and commercial fisheries. This report has drawn heavily on their work. One Cuban researcher has provide the author a list of 41 reports on which he personally worked.[1057] There were several other authors who worked on large pelagics. Unfortunately these works are not well known outside Cuba. The best known works are those that were published by ICCAT, but this is only a small part of the work conducted. Most of this research was published in Cuban journals and few U.S. libraries have collections of these journals. These journals may be available in some foreign libraries, but the authors note that few have been indexed in major international scientific index services like ASFA. Another major problem is that some research studies were never published at all. U.S. and other foreign researchers may find that the only was to access unpublished Cuban research and even some published material is to work with Cuban researchers.

The authors and other international observers have noted a substantial decline in published fisheries research beginning in the late 1980s, but especially during the 1990s.[1058] The decline in the number of published works is due to the economic crisis. Fewer studies were done because of the cuts in funding for field work. The Government attempted to continue funding the salaries of Cuban researchers so that the staffs at the various research institutes could be maintained.[1059] Even so, there were layoffs. Other researchers left voluntarily. Even less money has been available for publication, so that in some cases research which was completed has not been published. A Cuban researcher recalls great difficulties publishing reports in the late 1980s.[1060] One Cuban researcher reports that he had increasing difficulty beginning about 1980 obtaining approval for distant-water research. He indicates that research on highly migratory species could be quite expensive. Officials began to give increasing attention to research on coastal fisheries and aquaculture. Not only was this research less expensive, but the prevailing view was that these were resources that Cuba actually possessed and thus could fully control.[1061] Even so, distant-water research was conducted during this period. Many of these studies are listed in "Sources".One journalist in 1992 mentions a paper shortage and moratorium on publishing.[1062] Cuban sources report that since 1997, the economic situation has improved and some marine research has been resumed.[1063]

Cuban research institutes were quite active in the 1970s and 80s. A substantial number of young biologists were trained in Soviet universities and institutes, providing Cuba the largest corps of trained marine biologists among all of the Caribbean island countries. Quite a number of research papers were published by Cuban institutes beginning in the mid-1960s. Publication slowed beginning in the mid-1980s and the authors have noted a marked decline in the number of published works during the 1990s. Other U.S. researchers have made similar observations.[1064] Cuban researchers tell the authors that represents both a decline in the level of research and the fact that many studies are not being published.[1065] Both appear to be the case. Certainly the economic disruptions of the late 1980s and early 1990s, when the massive Soviet subsidies were terminated, seriously impacted the budgets and programs of Cuban research institutes. Knowledgeable observers report, for example, that valuable CIP personnel have left for more financially rewarding jobs such as opening a "paladare" or working in the tourist industry. Others have left Cuba. There have also been lay-offs.[1066]

The authors have had difficulty obtaining Cuban research on highly migratory (HMS) species. These reports on not listed in many fishery data bases such as ASFA. The most accessible Cuban papers are the ones published by ICCAT.[1067] We believe, however, that we have obtained many important Cuban works completed on swordfish and related species in coastal waters.[1068] We have fewer studies on research conducted in the distant-water fisheries aboard FAC

longliners. Accounts vary as to how many studies were published on the distant-water longline fishery. One Cuban researcher estimates that about 20 such studies were published in CIP and UH journals.[1069] Another researcher believes that fewer studies were actually published.[1070] Apparently FAC had no long-term ongoing research program on its distant longliners. Rather the studies conducted were the result of occasional efforts of individual researchers.[1071] The former principal CIP researcher for large pelagics does not believe that there has been any significant Cuban work on these species since he left Cuba in 1991.[1072] There are, however, many papers that have never been published.[1073] We do not know what kind of grey literature may exist in Cuba, but it has proven impossible for the authors to access this literature and we do not know how or if the CIP and UH has handled the archiving of this unpublished research.[1074] In addition, much of the data collected by FAC has not been analyzed. One researcher describes a "great mass" of unpublished data. CIP researchers aboard FAC longliners are known to have done extensive sampling (size and sex data) and maturation work.[1075] Some work was done on catch variations by depth.[1076] Data was compiled on the yields reported by FAC.[1077]

There has been a major change a Cuban research institutes in the 1990s. The economic crisis has forced the Government to require research institutes to generate at least part of their own budgets. The CIP has been forced, for example, to seek international and domestic contracts. The result has been that opportunities for foreign travel and exchanges with foreign research institutes and universities have increased. The CIP negotiates contracts for its staff. Normally the foreign institute or university is expected to cover basic living expenses and pay a salary. Half of the salary goes to the CIP and half to the individual researcher.[1078] This new approach has proven to be a two-edged sword. On one hand these contracts have brought the CIP needed income and provided valuable experiences and exposure to international scholarship. On the other hand some of the individuals involved have used these opportunities to leave Cuba.

Photo 52.--Cuban and U.S. researchers participating in a shark tagging cruise aboard the NOAA research vessel "Oregon II" in 1998. A planned follow-up year 2000 survey was not conducted. M. Grace

Despite the Cuban research effort on large pelagics, the authors have noted that relatively few tags have been returned by Cuban fishermen. The authors have had difficulty determining precisely what the Cuban policy was concerning returning tags. There has been some tag returns so we know that returning tags was not absolutely prohibited. Most of the tag returns, however, have come from recreational fishermen. We know of very few tag returns from the artisanal and commercial fishermen. Cuba sources report that while there was no prohibition, there was no interest on the part of these fishermen to return tags. Few thought that they would ever received prizes that were offered.[1079] Of course, the fact that most of the tags encountered were from the United States did not help. A Cuban researcher reports that during times of especially strained relations even recreational fishermen would not return tags.[1080] One turtle researcher reports that for a time MIP insisted on receiving tags, but now individuals can submit them directly.[1081] Having to go through MIP probably reduced the chances that the individual fisherman would receive potential prizes and may have tended to create the impression by the fishermen that sending in tags was not worth the effort.

Cuba has three major research institutes which study fishery and marine topics. The CIP is dedicated entirely to fisheries research and has done considerable work on tuna, but the authors know of very limited research on swordfish. The published Cuban work that does exist on swordfish is almost entirely devoted to the coastal artisanal fishery. The authors know of very little research published by the Cubans on their commercial longline fishery and nothing specifically related to swordfish. The CIP research program over the years is known to have covered skipjack, blackfin, billfish (especially blue marlin), and mackerels.[1082] The other two important institutes, the CIM and IO, work mainly in marine ecology, life cycles, oceanography, geology, and other related subjects, but also do some research on fisheries. An IO researcher has done some important work on swordfish and other oceanic pelagics.

CIM: The Centro de Investigaciones Marinos (CIM) at the Universidad de Havana has an active fisheries program. CIM and IO researchers worked with Smithsonian and other U.S. researchers in an effort during 1995-96 to complete an inventory of Cuban fauna and flora. The CIM has sponsored some work on sea turtles. The authors know of no specific work on longline interactions, but the CIM has sponsored conservation work at nesting sites near the artisanal longline grounds off northwestern Cuba.[1083]

CIP: The Centro de Investigaciones Pesqueras (CIP) of the MIP is responsible for conducting studies needed for fisheries management in Cuba. They also advised the MIP, the various state fishing fleets (including FAC), and the producer associations on available resources, technology, fishing methods, and other matters concerning their fishing operations. CIP research is often done in conjunction with MIP production units. The CIP in the 1950s and 60s gave considerable attention to the tuna baitboat (live-bait pole-and-line) fishery which at the time was one of Cuba's few commercial fisheries.[1084] One 1967 report indicated that research on tuna fisheries was one of four CIP working groups.[1085] The CIP cooperated with Soviet researchers on assessing tuna resources in the Caribbean.[1086] The CIP continues to work on the skipjack ("bonito") and black skipjack ("albacora") that are still used to supply Cuban canneries.[1087] CIP research efforts in 1981, for example, included port sampling of coastal skipjack and blackfin baitboat catches, dart tagging of skipjack and blackfin, exploratory tuna fishing in Cuban waters, oceanographic work to assess the relationship between skipjack/blackfin and water temperatures, and larval sampling.[1088] The Cuban tuna research effort has often focused on skipjack and this was especially true of 1981 when ICCAT coordinated the International Skipjack Year.[1089] The CIP has also done some work on highly migratory large pelagics, especially tunas and swordfish. The CIP as early as the 1950s was working on swordfish.[1090] Several Cuban fisheries target these species and they are thus of some commercial importance to the industry. Much of the work has focused on tuna. The CIP in 1962 initiated a major research and test fishing program on tunas. Some of this research has been conducted by CIP researchers working with FAC. This has included work on both yellowfin and bigeye tuna, in some cases done in cooperation with Russian scientists.[1091] At this early stage, swordfish does not appear to have greatly interested the Cubans. This was probably in part due to the fact that the Cubans were joining a Soviet research program already underway. The early studies done by or in cooperation with Soviet researchers was practical work like test fishing, but biological data was also collected.[1092] CIP large pelagic studies in the 1990s appear to ave been mostly on skipjack and blackfin tuna.[1093] Data on fishing methods was also compiled.[1094] CIP research has included studies on subjects like improving the handling of live-bait aboard tuna baitboats.[1095] There has also been some work on swordfish, such as a study to assess lunar phases on swordfish catches and biological assessments of the artisanal fishery off the northwestern coast.[1096] The CIP has also worked on turtles, but the authors do not know to what extent they have addressed bycatch issues.[1097] There appears to be relatively little current work at the CIP on swordfish, tuna, and other oceanic pelagics. CIP staff have forwarded to authors some reports on longlining, but they are all quite dated. The CIP's work program currently consists of work in four primary areas. Two of these areas are aquaculture and the other two are resource evaluation and improving processing methods.[1098] The CIP has also done some work on artificial habitats.[1099] One observer reports that the staff and work at the CIP has been seriously impaired by the economic crisis of the 1990s. The CIP which in the 1980s played a major role in the Cuban management process, now has virtually no role as the economic needs of the country are catch as much as possible to increase exports.[1100]

FG: The Flota del Golfo (FG), like Cuba's other fishing fleets, also conduct research--often in cooperation with the CIP and other fisheries research groups. FG researchers, for example, have worked with the CIP to assess the artisanal longline fishery conducted along Cuba's northwestern coast.[1101]

ICIT: The Instituto Cubano de Investigaciones Tecnológicas (ICIT) published reports on the skipjack and blackfin tuna fishery which supplied the domestic canning industry in 1961.[1102] The authors know of no further work in fisheries, presumably as the CIP, with Soviet assistance, was significantly expanded

during the 1960s.

INP: The Instituto Nacional de la Pesca (INP) is the former name of the overall Cuban fisheries agency, before it was elevated to ministerial rank as the Ministerio de la Industria Pesquera (MIP) .[1103] This can be confusing as many early Cuban fisheries research publications include both the acronyms CIP and INP. In many other Latin American countries, the INP is the name of the primary government fisheries research group. Many early Cuban research studies are identified as INP studies on the title pages or INP/CIP studies. These studies were in fact CIP studies and INP is identified because the CIP was the research arm of the INP. Such publications include a variety of studies on tuna and other highly migratory species. Some of the work was done in cooperation with Soviet researchers.[1104] The INP has also pursued studies of the fishery for skipjack and blackfin tuna in coastal waters that supplies Cuban canneries.[1105]

IO: The Instituto de Oceanología focuses on oceanography, but is involved in a wide range of research on related topics, including marine ecology, life cycles, geology, fisheries, and other subjects. The IO has done some important work on the biology and fisheries of swordfish, billfish, and sharks.[1106] Most of its fisheries work, however, has been on the life cycle, ecology, and fisheries of neuritic fish.[1107] The IO has extensively researched the oceanographic regime of the wider-Caribbean and especially the Cuban shelf. Many studies on the Cuban shelf have been done on geology, geomorphology, hidrochemistry, and biology. Detailed studies have also been done on the composition and distribution of benthos, plankton, primary productivity, as well as the ecology of fishes, the state of coral reefs and other marine habitats, marine pollution, and other fishery related topics.[1108] One of the IO's most important fishery projects is a massive 4 volume overview of marine species.[1109] The IO has done some work on artificial habitats, primarily for neuritic species.[1110] The IO has also expressed a desire to work with Fish Aggregating Devices (FADs). The IO in the late 1990s were working with the U.S. company, McIntosh Marine, on sonically assessing the efficacy of FADs in attracting bonito. The project was canceled because of a lack of infrastructure and lack of funding from Cuban agencies and a French group to provide needed funding.[1111]

UH: The Universidad de la Habana (UH) at its affiliated research units have done considerable work on fisheries, including work on longline fisheries. Obtaining complete details on Cuban research has proven difficult, but UH researchers have apparently not addressed swordfish.[1112]

Others: Other Cuban researchers have done some work on swordfish, including the effect of moon cycles on swordfish behavior.[1113] The authors are not aware of the institutional affiliation of some researchers who have worked on swordfish.[1114]

B. Foreign researchers

Quite a number of multilateral and foreign research groups have worked with Cuba or done work in waters around Cuba. Several U.S. research groups, mostly academic and environmental groups, have been active in Cuba.

AtlanNIRO: The principal Soviet research institute for Atlantic fisheries research was AtlanNIRO. One element of the broad cooperative effort developed to support the Cuban fishing industry was work on tuna. This supported a Soviet goal of launching a tuna fishery of their own. The Soviets used several research vessels in the early 1960s for test fishing throughout the tropical Atlantic as part of a joint research effort with the Cubans. The Cuban and Soviet work at this time focused on tuna with little mention of swordfish.[1115] Cooperative research program was one of the issues discussed at annual meetings of the Comisión Mixta Cubano-Soviético para la Pesca Marítima (Joint Cuban-Soviet Commission on Marine Fishing).[1116]

CAN: The CIP is active with French, Mexican and other researchers in the Caribbean Acoustic Network (CAN). Work has been done on acoustic sampling, groupers, and thermal fronts. The authors know of no work on tuna or swordfish.[1117]

ESM: A Cuban researcher traveled to Japan in 1960 and collected data on Japanese Atlantic tuna longline fisheries from the Experimental Station of Misahi (ESM).[1118] This may have been a follow up on the Japanese test fishing contracted during the late 1950s. The relationship to the subsequent 1961 contracting of vessel construction in Japan is unknown.

FAO: FAO has provided some assistance to Cuban researchers. One project carried out during the 1960s, including work on how to modernize the artisanal fishery for tuna and other large pelagics.[1119] Another FAO project was to assess the fishery for tuna, swordfish, and related species in the artisanal fisheries off the Cuban coast.[1120]

Harbor Branch: The Harbor Branch Oceanographic Institution in Florida has done some work with Cuba. Their research vessel *Seward Johnson* was deployed in Cuban waters during 1997. The HBC work was a multi-discipline cruise consisting of shallow and deep (1,000 m) water research on fish biology, algae, and sponges. One group also studied marine bioluminescence in the water column around Cuba.[1121]

ICCAT: Cuban researchers have carried out biological sampling in domestic ports, primarily on tunas and

billfish.[1122] Cuban officials have also permitted ICCAT sampling of FAC tuna landings at Las Palmas.[1123]

INP: Cuban researchers work with the Mexican Instituto Nacional de Pesca (INP) on a wide range of fishery projects. One of those programs includes research on sharks in a cooperative effort with the United States. There may be other cooperative programs with the INP on pelagic species but the authors do not have information on the full extent of Cuban-Mexican cooperative efforts.

Japan: The Cubans relied heavily on the Japanese in the early years of developing a tuna longline fishery. The authors are unsure as to just which Cuban institutes, companies/shipyards, and government agencies that the Cubans were working with, other than ESM mentioned above. The Soviets who had a major fisheries assistance program in Cuba had little expertise with longlining on which the Cubans could draw. Unlike the relationship with the Soviets where joint research was conducted, there does not appear to have been close cooperation with Japanese research institutes. Rather the Cubans and Soviets evaluated available information in fishing methods and catch data from Japanese and other fishing operations.[1124] The Japanese did conduct exploratory fishing operations at various times in Cuban waters which provided useful data to the Cubans.[1125] The Cubans also hired several Japanese fishermen to serve as vessel captains or fishing masters as well as other technical specialties. The authors have no information as to what extent, if any, the Japanese Government was involved with these contracts.

LSU: Researchers at Louisiana State University (LSU) during the 1980s worked with Cuban research groups, including the National Academy of Sciences and the CIP. The primary interest was a cooperative king mackerel tagging program and to obtain Cuban mackerel catch data. LSU researchers also pursued more general fishery cooperation interests with Cuban biologists.[1126]

NMFS/NOAA: NMFS initiated some scientific exchanges with Cuba during the Carter Administration.[1127] NOAA research vessels worked in Cuban waters during 1977 and 1978. Such exchanges were terminated by the Reagan Administration. Some activity was resumed during the Clinton Administration. The NOAA research vessel *Malcom Baldridge* was allowed to work in Cuban waters during 1996. Cuban and United States researchers in the 1990s initiated cooperative research on sharks as part of a joint effort already underway with the Mexican INP. Given Cuba's location, work in Cuba would add valuable information on the migratory movement of many shark species. The NOAA research vessel *Oregon II* carrying NMFS biologists entered Havana harbor in 1998 to pick up participating Cuban researchers. It was the first U.S. Government fisheries research vessel permitted to enter Havana since the Revolution seized power in 1959. The vessel was deployed as part of the cooperative shark survey already underway in U.S. and Mexican waters. Sharks were tagged to help understand migratory movements.[1128] Considerable data was compiled on sharks as well as swordfish and other species taken. The presence of seabirds and marine mammals was noted. In addition to research stations along the Cuban coast, some work was also done off Navassa Island southeast of Cuba.[1129] NMFS personnel speak highly of the role played by the Cuban participants. An additional shark research cruise on *Oregon II* had been planned for 2000 in both Cuban and Mexican waters. Plans had to be canceled, however, due to logistical constraints. NMFS researchers are hopeful that a shark research cruise can be conducted in the future.[1130]

NSU: The National Coral Reef Institute at Nova Southeastern University (NSU) has been working on coral reefs with the Cuban Instituto de Oceanologia.

SCDNR: The South Carolina Department of Natural Resources (SCDNR) has been compiling data on billfish catches. Blue marlin and sailfish are the most important billfish, but swordfish are also reported. Researchers at SCDNR are attempting to compare the catch rates in specific areas with associated weather patterns.[1131] The South Carolina researchers are not working with the Cubans, but as the swordfish off Cuba and the United States is a shared resource, the work of the South Carolina researchers is providing valuable information needed to better understand swordfish behavior and migratory patterns in the Caribbean and Atlantic off Cuba and the southeastern United States.

UC: CIP assessments during the early 1960s of tuna fishing grounds indicated some cooperation with Marine Biology Station at the University of Ceara (UC) in Fortaleza, Brazil.[1132]

UF: University of Florida (UF) researchers have done considerable work on fisheries economics, including some useful assessments of the U.S. swordfish fishery.[1133] Some of the UF researchers have been working with Cuban researchers in general exchanges on the fishing industry. These exchanges, however, for the most part have not involved the swordfish fishery.[1134]

UM: University of Miami (UM) researchers have done extensive work on swordfish, tuna, billfish and related species. The Rosenstiel School of Marine and Atmospheric Sciences began research on swordfish in 1965.[1135]. There does not appear to have been extensive contacts between UM and Cuban researchers, however, given the number of UM researchers

involved, the authors can not confirm that there have been no contacts. Current UM researchers have attempted to contact Cuban research institutes, but the Cubans have reportedly been unresponsive. UM researchers are unsure if the reason that the Cubans have not expressed an interest in their research is due to the species, the lack of available staff, the strained political relationship between Cuba and the United States, or some other unknown reason.[1136] UM researchers would particularly like to include Cuban researchers in their current work on billfish and swordfish larvae in the Florida Straits. One researcher believes that the area between the Gulf of Mexico and Florida Straits (about 24°N, 83°W) is a particularly dynamic area and would like to include areas located in Cuban waters in the UM study.[1137] UM researchers in 1994-95 conducted a pilot study which has led to multi-year fisheries independent empirical field studies. The researchers in 1998 began work in the Florida Straits between Cuba and the United States on billfish larvae, especially sailfish and swordfish.[1138] The researchers are identifying the larvae present in the Straits and running PCR genetic amplification tests on the larvae to determine precisely which fish are spawning in the Straits.[1139] The UM has other fishery projects in Cuba, including an assessment of coral reefs.

Other: A variety of other U.S. institutes and environmental groups have reported some fishery or fishery-related activities in Cuba. Some of the groups involved are Center for Marine Conservation, Coastal Research and Education, Environmental Defense, Reef Relief, and others. Several U.S. research institutes, state agencies, and university groups are working on swordfish. This work for the most part, however, is not being conducted in cooperation with Cuban researchers. As the swordfish off Cuba and the United States is a shared resource, the work of the U.S. researchers is providing valuable information needed to better understand the swordfish off Cuba and other Caribbean islands.

XV. Bycatch

Cuba has the largest fishing industry of the various Caribbean islands. The size and location of the island provide many critical habitats that are important to fisheries in the Caribbean and southeastern United States. Current flow and migratory pattern of many aquatic organisms mean that Cuban management of its resources affects the fisheries of several neighboring countries, including the United States. If Cuba was to manage its fishery resources irresponsibly, as is the case with some Caribbean islands, the impacts would almost certainly be widely felt.

Bycatch issues are an important part of the overall management process. Cuban bycatch policies are of greater importance than on many other Caribbean islands because of the importance of the fishing industry and size and location of the island. Cuba has, however, given relatively limited attention to many bycatch issues. Several factors may be involved in limiting the Cuban interest in bycatch issues.

Limited resources: Cuba because of its poorly performing economy has only limited available resources. High priority programs in Cuba, including education and public health, are underfunded--directly impacting the basic needed of the Cuban people. There are shortages of food and basic consumer products. Officials have not shown any great interest in using the limited available resources for projects which they consider to be of lesser priority, such as bycatch work.

Production focus: The primary focus of MIP is to produce seafood, both for export and domestic consumption. Given the food shortages in Cuba and the need to generate foreign currency, the importance of maximizing is felt throughout the agency. The agency is also involved with some conservation issues, such as sea turtles. The MIP's focus, however, is on production and in most cases issues such as conservation and bycatch play a secondary role. Much of the bycatch work that is conducted in Cuba has focused on how to utilize the bycatch, such as the shrimp bycatch, rather than how to minimize it.

Environmental movement: The authors know of no independent environmental movement in Cuba. The PCC does not permit independent groups to organize, such as independent labor unions, which could challenge its authority or Government decisions. The also are no known operating environmental non-government organizations (NGOs) of any importance, although not all observers would fully agree with that statement.[1140] Environmentalists who have tried to organize an NGO have been arrested.[1141] Likewise there is no independent court system through which

Government decisions and programs could be legally challenged by NGOs. Cuba is unique in this regard in the Caribbean. The strength of the environmental movement varies in the Caribbean. Environmental groups are developing some strength on various islands, especially when they seek common cause with recreational fishermen and tourist interests. Other islands still have a very weak environmental movement. Only in Cuba, however, are independent, local environmental NGOs absent and there is no possibility of challenging government actions through the courts. This is important because it is often such groups that become vocal advocates supporting bycatch reduction efforts.

The term bycatch is used here to discuss the species other than swordfish taken by Cuban fishermen and not the portion of the catch which is unwanted or discarded. The term, which has many varied meanings, is used here to describe the non-swordfish catch of the U.S. swordfish longline fleet. Although this definition is less applicable in describing many foreign fleets, it allows us to discuss the status of the same species in the same chapter throughout this report whether or not the species is considered a bycatch. This makes it easier for the reader to find the discussion of each of these species. In many Caribbean countries, some of these species are considered target species and not a bycatch. In Cuba, for example, the primary target species for the commercial longline fishery was yellowfin tuna. Cuban fishermen do not consider tuna, billfish, some sharks, and other species to be a bycatch, but are rather either species the fishermen target or take in quantity and utilize. In fact, the artisanal fishermen use virtually everything they catch. The principal bycatch which was not used by the commercial fishermen was shark.[1142] For organizational simplicity throughout this series of reports on swordfish, the authors have continued to entitle this chapter "bycatch" even though it is a misnomer in some fisheries. In any case, the bycatch section of this report is where species other than swordfish taken in the longline fishery are discussed.

The authors have been unable to find any recent Cuban research on the bycatch of their longline fishery, either the artisanal or commercial fishery. As the Cubans do not classify many of these species as bycatch, one has to look at the catch composition data discussed in "VI. Fleet Operations". Some species are taken in such small quantities or are not of commercial importance that they are not recorded in the catch composition data. Dated catch composition information as well as published catch data available through international organizations offer some insights. Some historical information, as well as available information from foreign fishermen offers further insights on bycatch trends.

Cuban researchers have provided some basic data on the catch composition of the longline fleet. The available data, however, is sketchy and refers to only a few years. It is also very dated data. Many bycatch species that U.S. fishermen consider to be a bycatch, especially sharks, are retained by the Cubans and thus reported as catch data. This data is noted below under each species category.

Artisanal bycatch: Cuban sources report that the artisanal fishermen retained virtually everything they caught so the term "bycatch" is a misnomer in discussions of this fishery.[1143] The authors have access to only a few Cuban articles reporting on the catch composition of the artisanal longline fishery.[1144] Available studies show highly varied results. One author reports that the artisanal longline fishermen generally took about 70 percent more swordfish than billfish.[1145] Test fishing in the 1960s showed large catches of billfish, but only partial year data is available (appendix C4a1a1). One 1973 report indicated that the artisanal longline catch off Cuba's northwestern coast was composed of: sharks (41 percent), billfish (33 percent), and swordfish (26 percent) (appendix C4a1b).[1146] A 1980s study reported a larger proportion of swordfish (appendix C4a2a-b).[1147] Another 1980s showed another different species composition.[1148] Given the highly migratory nature of the target species, substantial annual fluctuations are not unusual. Tunas were not mentioned in either study, probably because the nocturnal sets resulted in minimal catches. The complete absence of tuna seems unusual and is not explained in the source article.

Commercial fishery: The authors also have very limited data on the catch composition of Cuba's commercial longline fishery. The most detailed report found by the authors indicates that in 1982-86 that the commercial longline fishery in the Atlantic reported catches of: tuna (55 percent), sharks (19 percent), billfish (13 percent), swordfish (12 percent), and other species (2 percent) (appendix C4b1).[1149] The importance of specific species does vary over time. Scattered reports in *Mar y Pesca* provide some insights. FAC, for example, reported that swordfish in 1987 constituted 24 percent of the catch.[1150] As the commercial longline fishery produced most of the oceanic pelagic catch, Cuban catch data can be used in assessing the composition (appendices C2a2a-b). There are some problems, however, associated with using general catch data to assess a specific fishery, such as in this case the commercial longline fishery.[1151]

Some idea of possible Cuban bycatch trends can be obtained by assessing the data reported by the U.S. longline fleet in the Gulf if Mexico, western atlantic and Caribbean. While this data does not pertain specifically to Cuban waters or fishing strategies used by Cuban fishermen, it does provide some useful benchmark data.[1152] This is especially important because there are so few Cuban sources providing catch composition data. NMFS collects detailed catch data as well as administers an observer program which is useful in verifying the catch data submitted.

Northwestern Cuban coast: Cuba's northwestern coast faces the Gulf of Mexico. The Cuban artisanal fishery conducted along the island's northwestern coast falls within the U.S. Gulf of Mexico statistical area. Data reported by U.S. fishermen in the Gulf of Mexico may thus provide some insights into bycatch trends (appendices F1a-b). The coastal nature of the Cuban operations and the substantially differing fishing methods, almost certainly mean that there is a significantly different species composition in the catch than that reported by U.S. longline fishermen. The Cubans have not fished in the western and northern Gulf and in recent years appear to have limited operations close to the Cuban coast. Notably, the Cuban fishermen report much smaller swordfish than reported by U.S. fishermen. The U.S. data, however, does provide much more detailed species data than the Cuban data available to the authors and while not directly applicable offers some insights on some of the species that the Cubans may be taking.

Caribbean operations: Some idea of Cuban bycatch trends in the Caribbean are available by assessing the data reported by the U.S. longline fleet in its Caribbean operations (Puerto Rico, appendices G1a-b).[1153] While this data is labeled as Caribbean, much of the U.S. fishing takes place outside the Antillian Arc and the same is true of the Cuban fishery (appendix C8f). The Cuban and U.S. fishing patterns are thus similar, although the Cubans focus more on equatorial latitudes than the U.S. fishermen.

Eastern Atlantic operations: U.S. longline fishermen do not operate in the eastern Atlantic, thus there is no comparative U.S. bycatch data for this important area of Cuban operations.

Several distant-water fishing countries operate longliners in the Atlantic at various latitudes, some of which overlap with Cuban ground. The two most important fisheries are conducted by Japan and Spain, although Taiwan is also of some importance. These countries submit their catch data to ICCAT. The authors do not know, however, of any observer program conducted by these countries. There is some indication, however, that some observer data has been collected.[1154]

The primary target of the Cuban longline fishery from the beginning of the commercial fishery was tuna--especially yellowfin. Tuna accounted for the bulk of commercial earnings. Swordfish and billfish also contributed to earnings. Most income generating exports have been shipments of these species to Europe (mostly Spain) and Japan (appendix E2). A substantial part of Cuban landings in the longline fishery, especially during the 1990s in quantitative terms has been shark (appendices B1a2 and C2a2b). These landings make relatively minor contributions to fleet earnings, and are used mostly to supply domestic markets.

Catch fluctuations in the Cuban longline fishery since the late 1980s have been affected by Cuba's overall economic problems and the difficulty obtaining fuel and replacement parts which required hard currency purchases. Thus the sharp declines in the catches of each species have had little to do with species population trends, but rather reflected the overall impact of political and economic developments and fishing effort.[1155] One puzzling fact is why FAC did not focus fleet operations during the early 1990s more heavily on tuna. One would have thought that as subsidized Soviet oil was cut off that the Cubans would have increasingly concentrated operations on exportable species such as tuna and swordfish. This did not occur and instead shark, which for the most part is not exportable, became an increasingly important portion of the longline catch.

A. Tunas

1. Commercial

The Cuban commercial longline fleet was established in the early 1960s. The fleet was organized as the Flota Cubana de Pesca (FCP) which was later split to create the Flota Atunera Cubana (FAC). The initial Cuban target was primarily tuna, especially yellowfin. Tuna was thus not an incidental bycatch in the Cuban longline fishery. Tuna continued to be the primary target for the commercial longline fleet until the 1990s. Since the closure of FAC, Cuban tuna catches have declined significantly. Much of the current tuna catch is skipjack (*Katsuwonus/Euthynnus pelamis*) and other small tunas which are Cuba's principal oceanic fishery resources.[1156] These species are taken by the baitboat fleet.

Catch trends: Yellowfin has been the primary tuna species taken in the Cuban longline fishery, although bigeye has been important in some early years of the (appendix C9b).[1157] Fishermen began reporting yellowfin catches in 1963 as Cuba's newly purchased longliners were deployed. Catches increased to 3,000

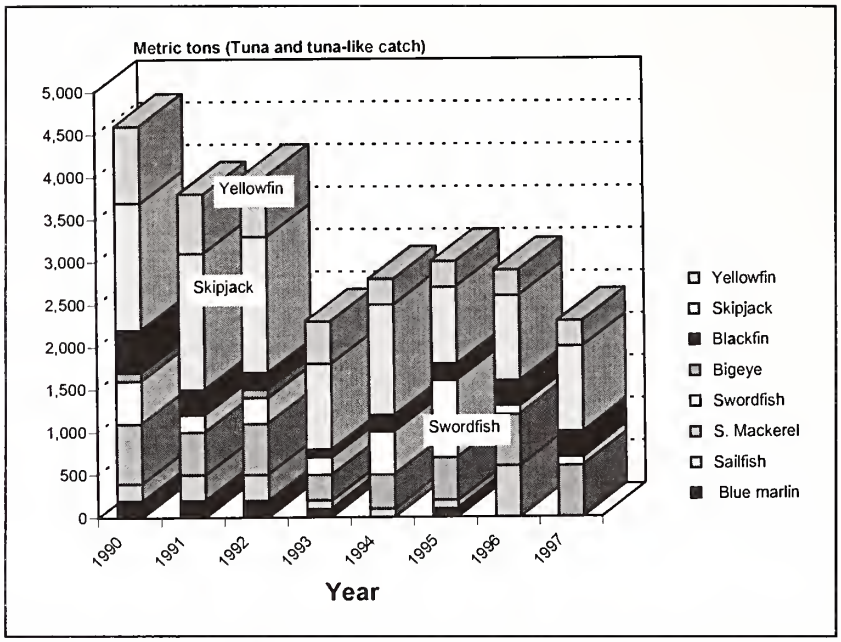


Figure 67.--Catches of yellowfin, the species targeted by the Cuban commercial longline fishery, declined sharply during the 1990s as the FAC longliners were retired.

t in 1967, before declining. A 4,400 t record was set in 1973. The all-time record of 5,600 t was set in 1980. Catches declined sharply in the late 1980s and early 1990s. The 1997 catch was only about 300 t, mostly taken in the eastern Atlantic (appendix C9c1). This suggests one or two commercial longliners were still active. Skipjack catches were also important (appendix C2a1). The skipjack was not taken by longlines, but by FAC's single purseseiner in the eastern Atlantic and baitboats in Cuban coastal waters. Cuban skipjack catches, unlike the rest of the tuna catch, has not declined in the 1990s as it is being taken in the continuing coastal baitboat fishery (appendix C2a2).

Earnings: Yellowfin in particular was an important target species for FCP/FAC and in most years represented the bulk of earnings achieved.[1158] Other species are taken in smaller quantities, but in some years also made an important contribution to overall earnings. It was tuna, however, that dominated the non-shark or income generating portion of the catch.

Grounds: The bulk of Cuba's catch of exportable tuna (mostly yellowfin and some bigeye) came from commercial longliners operating at equatorial latitudes of the Atlantic--especially the eastern Atlantic off western Africa.[1159] For the purposes of this report, the authors have only developed detailed data on the areas where the Cubans have taken swordfish (appendix C8d2b). This swordfish data also provides a good indicator as to where the Cubans were taking yellowfin because it was the primary target species. The actual data for yellowfin is also available from ICCAT.[1160] The Cubans operated in both central and southern Atlantic grounds, but catches in all of these areas were at equatorial latitudes. Almost all of the Cuban tuna catch in the south Atlantic, for example, was reported north of 10°S. FAC did, however, conduct some limited longline operations in the Cuban EEZ. These operations were opportunistic in nature during the 1970s, but intensified somewhat during the 1980s.[1161]

Gear: The Cuban yellowfin fishery was conducted primarily by longliners. FAC did deploy one purse seiner which was to be the first of a substantial fleet of tuna seiners. The other purseseiners, however, never materialized. The *Jagua*, the sole Cuban longliner accounted for part of the yellowfin and skipjack catches. Purseseine catches were only a fraction of the longline catch. Purseseine-caught tuna (mostly yellowfin and skipjack) during the 1980s ranged from 340 t (1982) to 1,210 t (1986) (appendix C9d). Catches are believed to have been minimal by the mid-1990s, but this can not be confirmed because Cuba stopped reporting catches by gear type. Cuban tuna longline and purseseine catches are now minor, but the baitboat fleet continues to land skipjack and other small tunas in coastal operations (appendix C2a2a).

Target: Yellowfin tuna was the primary target species of the Cuban commercial longline fishery during most years. The authors note, however, that tuna catches declined and shark catches remained relatively constant during the 1990s (appendix C2a2b). Shark was initially planned to be a minor part of the longline catch (appendix A10a). Cuban captains appeared intent on catching sharks.[1162] As Cuba was having balance of payments problems in the 1990s, one might have thought FAC would have focused more intensely on readily marketable species like tuna. The value of sharks were rising and some species could be exported.[1163] Still the authors do not understand the FAC fleet management strategy which appears to have shifted from exporting tuna to supplying lower-value sharks the domestic market.

Species: While yellowfin was the primary target species for the FAC longliners in the distant-water fishery, they clearly did take other tuna species as well. Yellowfin catches predominated. One report assessing catch trends between 1982-86 indicated that yellowfin was nearly 50 percent of catches in Atlantic operations and almost 65 percent in the more limited operations within the EEZ. Bigeye catches approached 10 percent

of the catch in the Atlantic, but were very limited within the EEZ. Albacore catches were normally minimal, but in occasional years they could be of some importance (appendix C4b1).[1164]

2. Artisanal

The authors have noted two Cuban artisanal fisheries that used longlines:

Northwest coast: Tuna does not appear to have been a significant part of the artisanal longline catch off northwestern Cuba which targeted swordfish. The fishery off the northwestern coast was the most significant artisanal longline catch in Cuban coastal waters. Cuban researchers report minimal tuna catches in this fishery. Even a FAO masterfisherman assigned to help Cuba improve its coastal fishery reported relatively low tuna catches (appendix C4a3b).[1165] The artisanal catch is mostly swordfish, billfish, and shark. Sharks in one year accounted for over 40 percent of the catch (appendix C4a1b).[1166] It is unclear to the authors why at least some tunas were not also taken. The authors know of no multiple species longline fishery taking swordfish, billfish, and sharks that does not take at least some tunas. The depth and time of the sets precluded any large quantities of tuna from being taken.[1167] Small quantities of tuna were apparently taken, but were often not mentioned because they were such a small proportion of the catch.

Southeast coast: Cuban press reports mention a smaller artisanal fishery using longlines and harpoons which targeted tuna, especially bluefin. The fishermen used about 16 Sigma and Cardenas class vessels from ports (Punta Gorda--Santiago de Cuba, Cabo Cruz, Niquero, and Pilón) along the southeastern coast. Operations were conducted during April and May in the Caribbean, but generally in Cuban waters. Good catches were reported in the 1960s, often accounted for about 50 bluefin daily. Catches began to decline in the early 1970s and one report published in 1974 indicated that it was taking about 20 days to land the same 50 bluefins that were being landed in a single day during the 1960s.[1168]

The tuna longline fishery in Cuban waters has been relatively limited. Artisanal fishermen have primarily conducted the fishery and generally reported only limited tuna catches. Some limited commercial fishing has been attempted. The authors have been able to obtain only limited information on these operations.[1169]

B. Billfish

Cuban fishermen take substantial quantities of billfish. Billfish was not as important to the Cuban fishery as tuna, but very substantial quantities were caught in some years. The catch was both exported and marketed domestically. The authors do not have any information on the fishing strategy of Cuban longline fishermen and to what extent billfish were actually targeted. Billfish have been taken in both the commercial and artisanal fishery. They were clearly targeted by the artisanal fishermen, however, the fishing strategy of the more important commercial fishery was less clear.

Commercial fishery: The quantities of billfish taken in the commercial tuna fishery suggest that billfish may not have been merely an incidental bycatch. Fishing patterns vary, but the commercial fishermen in some years appear to have targeted billfish and/or sharks. The Cubans have reported billfish catches approaching 1,500 t (appendix C10b). Grounds targeted and the species landed have also varied over time.

Artisanal fishery: The artisanal fishermen appear to have actually targeted billfish because catches constituted such a substantial part of the catch, but was substantially below the swordfish catch.[1170] One 1970s study indicated that 30 percent of the artisanal longline catch was billfish and that it exceeded the swordfish catch (appendix C4a1b). Other studies, however, show a larger swordfish catch (appendix C4a2a-b). The authors caution that this species

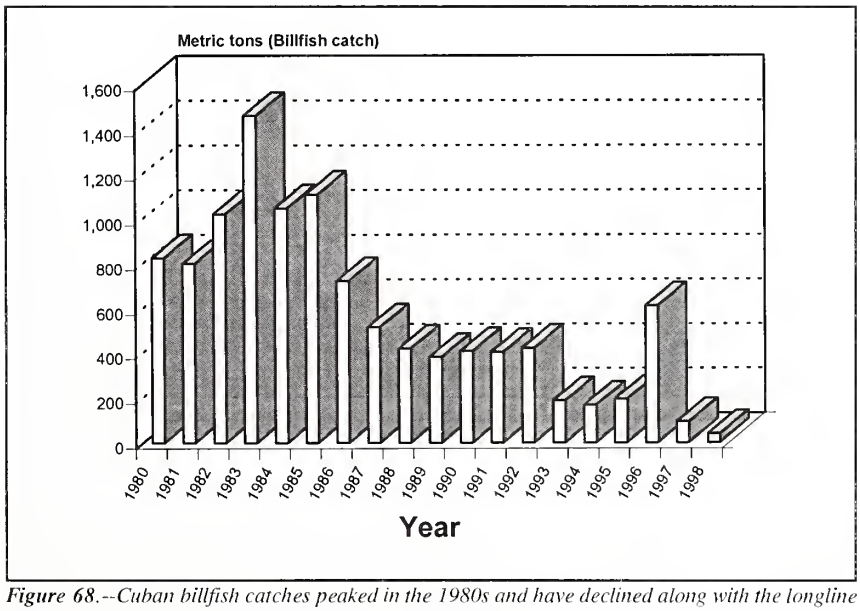


Figure 68.--Cuban billfish catches peaked in the 1980s and have declined along with the longline fishery. Unexplained high catches were reported in 1996.

composition data is based on only two studies and for only a few years.

Recreational: Cuban biologists note that billfish targeted by the sport fishermen are potentially of great value in attracting foreign anglers.[1171] This does not, however, appear to be reflected in Cuban management policies.

1. Commercial operations

Cuban commercial longline fishermen have taken three species of billfish in significant quantities: blue marlin, white marlin, and sailfish. The authors have been able to find relatively few Cuban descriptions of their distant-water fishery. Cuban researchers published several studies describing the artisanal fisheries, but there are relatively few detailed studies on the distant-water commercial fishery.

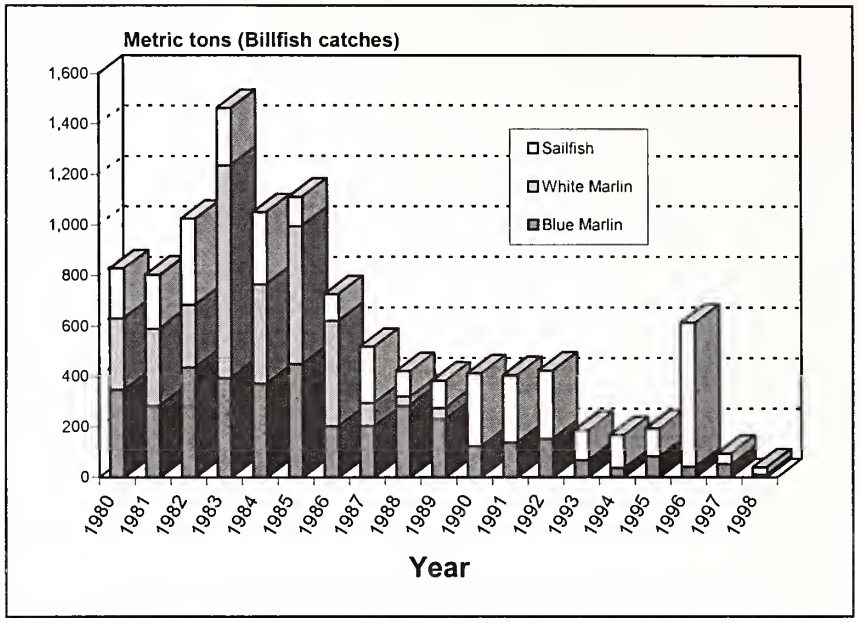


Figure 69.--The species of billfish taken by Cuban fishermen have varied over time. Sailfish has been the principal species taken in the 1990s. White marlin is now rarely taken.

Cuba reported the largest billfish catches in distant-water commercial longline operations off West Africa and in the mid-Atlantic. The importance of each species and the grounds fished have varied over time. The Cubans have noted sizeable catches in some years and minimal catches in other years for three billfish species. The overall trend has been substantially declining marlin catches, but erratic sailfish catches with record levels reported in 1996. Assessing the billfish bycatch trends is complicated by the differences between available sources.

Catch trends: Cuban catch data show that fishermen in the early 1970s were reporting very low billfish catches (appendix C10a1). Fleet managers appear to have adjusted fishing strategy in the 1980s as they began reporting billfish catches on approximately the same order of magnitude as the swordfish catch (appendix C6b). In some years catches are similar. In other years swordfish catches have been double the billfish catch and in other years the reverse has been true. Cuba's billfish fishery shows two peaks, 1974-75 (1,200-1,400 t) and 1982-95 (1,000-1,500 t) (appendix C6b). The Cuban billfish catch has since declined to only 40 t in 1998, although over 600 t was taken in 1996. This decline appears to be basically the result of reduced fishing effort because of the termination of Soviet subsidized oil deliveries and the expense of maintaining aging vessels.

Fishing strategy: Cuban fishermen appear to have pursued fishing strategies that limited billfish catches in the early 1970s. This appears to have changed in the mid-1970s. The authors are unsure as to whether the

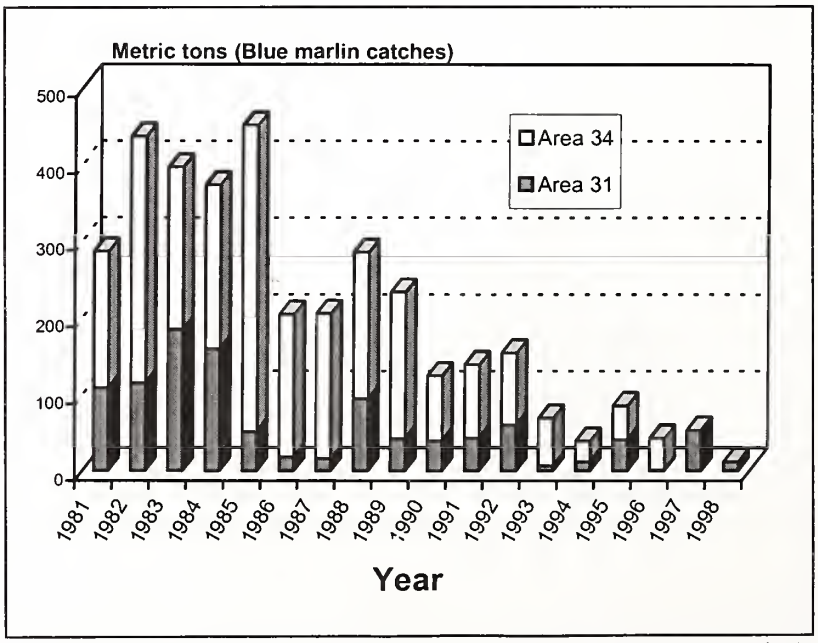


Figure 70.--Cuba reported substantial blue marlin catches in the 1980s, especially in the eastern Atlantic (area 34). Catches in the 1990s have fallen sharply and are now almost entirely in Cuban waters.

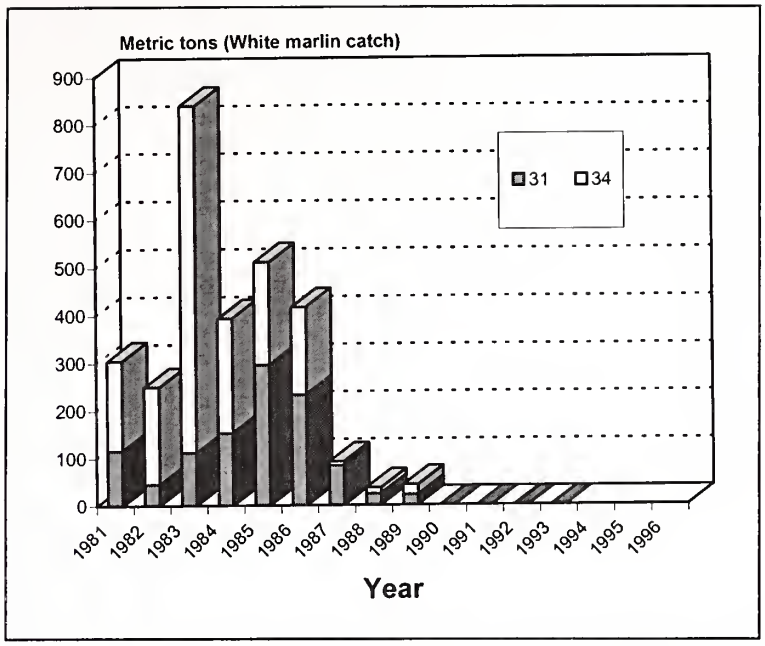


Figure 71.--Cuba used to report substantial white marlin catches in both the eastern (FAO area 34) and western (area 31) Atlantic, but in the late 1990s catches plummeted and are now minimal.

fluctuations in the billfish catch since the mid-1970s are the random results of incidental catches resulting from the tuna fishery or if Cuban fishermen adopted strategies to maximize or minimize the billfish catch. Fishermen from some countries attempt to limit the catch of non-target species to maximize target species hookings and to reserve hold space for the most valuable species. The random nature of billfish catch fluctuations suggest that the Cubans while targeting yellowfin did not pursue strategies to limit billfish and shark bycatches (appendix C6b). The Cuban fishing strategy may have been, in part, the consequence of access to subsidized fuel and low-paid crews. The normal economic factors were thus not acting to force the Cubans to conduct an efficient fishery.

Species: Overall billfish catch totals mask the very significant decline in blue and white marlin catches which have been replaced with increased sailfish catches. The fishing pattern for the individual species varies, although there are similarities with the two marlin species and differences with sailfish. Cuban fishermen in the early 1970s were reporting substantial catches of all three billfish, but blue marlin tended to be the most important species (appendix C10a1). After reporting large white marlin catches from 1983-86, reported catches of this species dropped to nil levels (appendices C10c1-2). The authors are unsure why this decline occurred. It does not appear to be changes in fishing strategy. Efforts to reduce white marlin catches would be likely to also reduce sailfish catches. Cuban fishermen reported, however, that while white marlin catches decreased, sailfish catches increased.[1172]

Catch composition: Catch composition data available from FAC indicates that in the 1980s that in the Atlantic they were reporting a billfish catch of about 13 percent, less than a third of which was blue marlin. The FAC reported a much larger billfish catch off Cuba (appendix Cb3), but this was only a small part of their overall commercial longline fishery.

Earnings: The authors have no data on the earnings associated with marlin catches. At least some of the billfish catch was exported to Japan (appendix E4a). The authors believe it was primarily the blue marlin that was exported, but have no actual data on which to base this. A substantial part of the billfish catch, probably the white marlin and sailfish, like the shark catch was marketed domestically. Domestic marketing significantly reduced the earnings of the billfish catch. There was in Cuba, however, no real accounting by state companies until the 1990s. Thus FAC could conduct its operations with little regard as to the

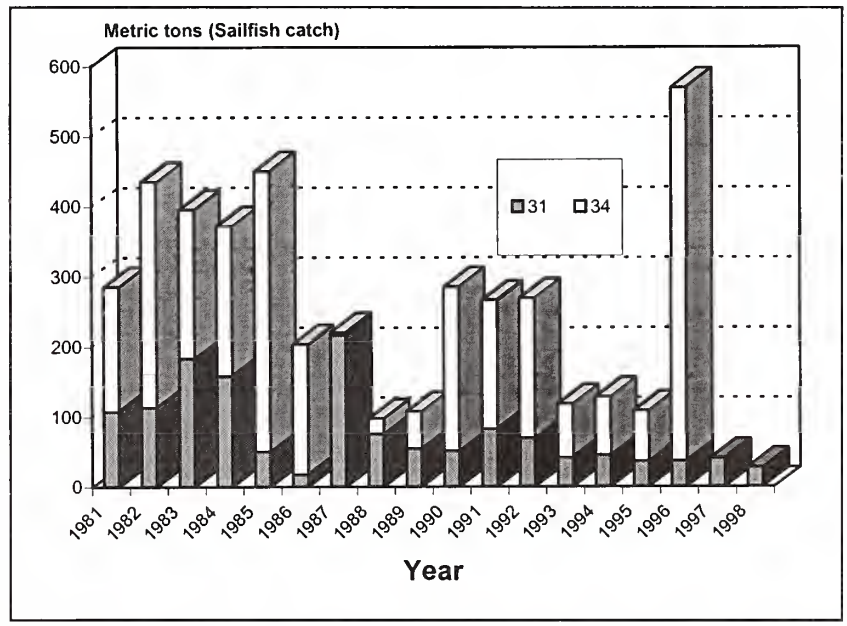


Figure 72.--The principal billfish now reported by Cuban fishermen is sailfish. A large catch was reported in the eastern Atlantic (FAO area 34) during 1996, but only small catches off Cuba are now reported.

product landed as long as the Soviets provided subsidized fuel. Interestingly after the Soviet fuel subsidy was terminated at the end of 1991, FAC continued its longline operations, albeit it at greatly reduced levels, into 1996--even though most of the catch was low-value billfish and shark (appendix C6b). This meant that beginning in 1992,[1173] the Cuba Government was providing fuel purchased with scarce hard currency to FAC for fishing operations--even though the catch was increasingly species that could not be exported.

Grounds: The grounds where billfish are taken have varied over time and are somewhat different for the three species. Virtually all of the catch is reported at equatorial latitudes. FAO and ICCAT both report catches in the north and south Atlantic, but the catch is in the equatorial areas of the north and south Atlantic respectively. The blue marlin catch was mostly taken in the eastern Atlantic, with the north Atlantic somewhat more important than the south Atlantic (appendices C10d1-2). White marlin was more variable being taken in both the eastern and western Atlantic. Catches in the early 1980s were more important in eastern Atlantic and in the late 1980s, the western Atlantic was more important (appendix C10e1). Generally more white marlin was taken in north than the south Atlantic (appendix C10e2). Sailfish was primarily taken in the eastern Atlantic (appendices C10f1).

Photo 53.--Artisanal longline fishermen taking billfish during the day and swordfish at night reported substantial shark bycatches. The authors have no current information on this fishery.

2. Artisanal fishery

Artisanal fishermen operating off northwestern Cuba took large quantities of billfish. Billfish were the second or third most important component of the catch. Actual accounts differ as to the importance of billfish to the artisanal fishery. A review of the fishery prepared in Cuba indicated the swordfish in most years was substantially more important than billfish.[1174] Another report compiled in 1971-73 indicated that about one-third of the artisanal large pelagic catch was billfish. The research group reported that the artisanal billfish catch was some what larger than the swordfish catch but smaller than the shark catch (appendix C4a1b). Another group in 1984-85, however, reported that the swordfish catches were much larger than billfish catches (appendices C4a2a-b).

Catch trends: The authors have no data on catches from the artisanal fishery.[1175] Available Cuban data appears to focus primarily on the commercial fishery. ICCAT data, for example, does not appear to include the artisanal fishery (appendix C8f).[1176]

Species: Available information on individual species taken in the artisanal fisheries include:

Blue marlin: The blue marlin season or run ("carate") usually begins in July, somewhat later than white marlin and lasts until October or November. Blue marlins inhabit deeper water than some other billfish. Most all of the artisanal blue marlin catch (over 90 percent) is taken at depths below 100 meters.[1177] Cuban sources report that the artisanal longline gear is preferable to the Japanese longline gear when targeting blue marlin. Adult females off Cuba are normally found with gonads extremely well developed, indicating they are ready to spawn and lay their eggs. Larval fish are commonly found in the Gulf of Mexico and waters off Cuba.[1178]

White marlin: The white marlin season or run ("carate") began in April or May and lasted until June or July. White marlin are denizens of the upper level of the water column. Most of the catch is taken at depths less than 100 meters. One Cuban study indicated that over 90 percent of the fish taken by the artisanal longliners was taken at less than 100 meters.[1179] Females of this species were also in advanced stages of gonadal development, indicating they were ready to lay their eggs. Larval fish are also found in the Gulf of Mexico and Cuban waters.[1180]

Other billfish: Artisanal fishermen did not report

significant sailfish catches.[1181] Recreational fishermen at major tournaments in the late 1970s reported that sailfish ranged from about 5-20 percent of the billfish catch, although it was 33 percent in one tournament (appendix C5a). A 2000 tournament reported only one sailfish was released (appendix C5b). While sailfish is of some importance to the recreational fishermen, it is the least importance of the three major billfish taken in the artisanal fishery.[1182]

Seasonality: Cuban sources report that billfish catches off Cuba are highly seasonal, suggesting migratory behavior.[1183] Catch rates varied from year to year, but were generally highest in the summer from May to October (appendix B1a1). Few billfish are taken from December to April.[1184] The migratory movements are presumably associated with shifting seasonal water temperatures (Venezuela, figures 16-20) and associated feeding and reproductive patterns.[1185]

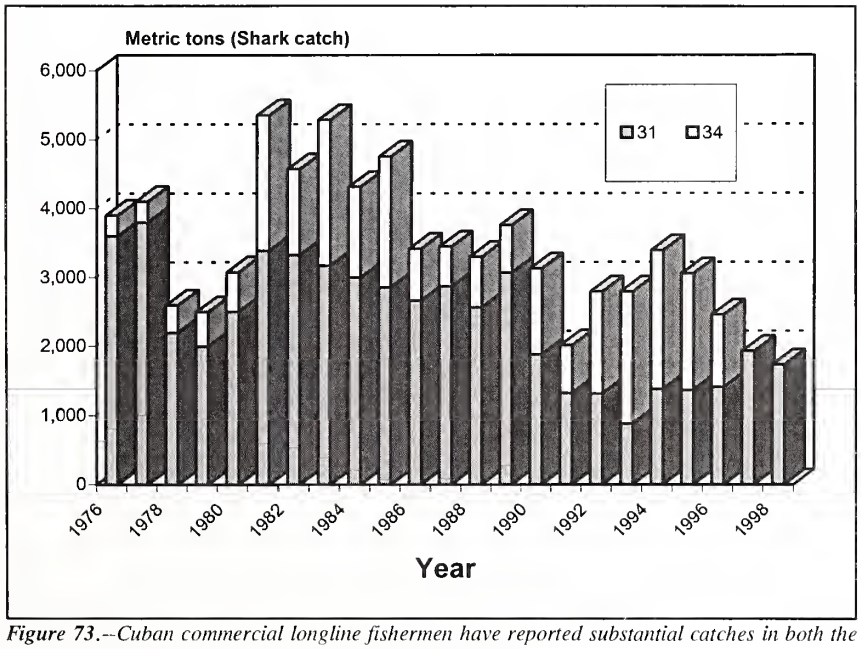


Figure 73.--Cuban commercial longline fishermen have reported substantial catches in both the eastern (FAO area 34) and western Atlantic (FAO area 31).

C. Sharks

Cuban fishermen have conducted a variety of artisanal and commercial fisheries for sharks. They were some of the first Caribbean fishermen to target the species. Cuban biologists have described the artisanal fisheries in detail, but less is known about the commercial longline fishery. Cuban fishermen also report substantial shark catches in the tuna and swordfish longline fisheries, both the commercial and artisanal fisheries. While these fisheries have primarily targeted more valuable pelagics, very substantial quantities of shark are taken. Shark is one of the species occasionally available in Cuban markets.[1186] Catches are reported in both the eastern and western Atlantic (appendix C11b). The catch off West Africa (FAO area 34) would be the bycatch from the commercial longline fleet. The coastal and Caribbean catch (FAO area 31) may come from more diverse fisheries, including an artisanal longline fishery off the northwestern coast. The differing ratios of swordfish to shark in the two FAO areas suggest that some different fisheries may have been involved (appendix C11c). The authors have primarily looked at Cuban sources as we are attempting to assess the shark bycatch of the Cuban fleet, however considerable biological research by both Mexican and U.S. researchers is available on sharks off Yucatán and in the Gulf of Mexico.[1187]

1. Artisanal fisheries

Artisanal fishermen have used both handlines as and locally developed longlines to take sharks. The handline fishery appears as early as the 1920s, but more is known about the pelagic longline fishery which began in the 1950s.

a. Handline operations

Cuban fishermen conducted a directed shark fishery from about 1920 to 1950. Fishermen used small boats, often renting them from a company. Most of the catch was taken with simple hand lines. Lesser quantities were taken with multiple hook lines or nets. The fishery was in many ways haphazard. Night sharks normally constituted 60-75 percent of the catch. The fishery sometimes focused on shark oil,

primarily aimed at obtaining vitamin A before it was synthesized. At other times the skins or fins were important. Most of these products were exported. The meat might be dried and consumed in Cuba, mostly in rural areas around the fishing ports.[1188] This directed fishery largely was terminated in the 1950s although a few vessels are still operated. Cuban researchers indicate that stocks of night sharks were badly depleted by the heavy fishing pressure.[1189] Both the United States commercial swordfish longline fishery off Florida and Cuban artisanal fisheries appear to have contributed to the decline of this species.[1190]

b. Longline operations

Artisanal fishermen along Cuba's northwestern coast in the 1970s reported that over 40 percent of the large pelagics they took were sharks (appendix C4a1b). The proportion of sharks has varied over time and seasonally (appendices B1a2 and C4a1a2). Considerable size differences have been reported seasonally (appendix C4a1a2).

Species: Artisanal fishermen during the 1970s normally took were 11 different species whose relative importance and seasonal patterns were quite distinct. The primary species included were silky/jaquetón (*Carcharhinus falciformis*), shortfin mako/dientuso azul (*Isurus oxyrinchus*), night shark/jesuita (*C. signatus*), and bigeye thresher/zorro (*Alopias superciliosus*) (appendix C11d).[1191] Many of these same species were also important in the early 1960s when the fishery was first launched, but the principal species than was dusky shark/amarillo (*C. obscuurus*) a species of limited importance in 1971-73. It is unclear why dusky shark catches have fallen so sharply. Cuba researchers speculate that it could be changing migratory patterns or over fishing.[1192] This artisanal fishery appears to have still been active in the late 1990s, but at reduced levels. A report published in 1990 indicated that sharks were the primary catch of the artisanal longline fishery and listed the primary species (appendix C4a4).[1193] The authors, however, have no current information on the fishery, including the species composition.

Time: Catch composition data for the early 1980s (1981-84) show that about 70 percent of the catch taken in nocturnal sets were shark, while sharks constituted only about 30 percent of diurnal sets (appendix B1a2).[1194]

Seasonality: Cuban researchers report that the catches of many shark species are highly seasonal with the bulk of the catches taken during the colder winter months. The researchers speculate that this may relate to migratory movements related to reproduction. Many of the large females taken in Cuban coastal waters are pregnant, often with well developed embryos.[1195]

Cuban authors have described six shark species as especially important to the shark fishery. The species composition of the shark catch varies and at any given time specific species may be added or deleted from this list.

Silky: Silky sharks were the most abundant species taken by the artisanal longline fishermen during the 1970s. It is also one of the smaller species. Off Cuba it is taken in coastal waters, 5-40 km from the coast in waters 160-200 m deep. The greatest catches were noted in 1983 and 1985.[1196] Fishermen reported that silky sharks, while considered a bycatch, could make up 60 percent of the catch on sets targeting billfish.[1197] These sharks migrate seasonally and while off Cuba they have their young. Artisanal fishermen off Cuba's northwest coast report juveniles with the umbilical scars still clearly visible. The large individuals are most abundant off Cuba in the summer and fall and this is the peak season in which they have their young, usually 8-10 individuals. The adults move away from Cuban waters at the beginning of the winter and as a result the local catch is then composed mostly of young adults.[1198] An article on silky sharks is one of the few published Cuban reports that the authors have noted in recent years.[1199]

Shortfin mako: Makos are present in Cuban waters all year round although they are most abundant during the summer, especially July and August. There is no notable seasonal difference in the size of the fish off Cuba so this species does not appear as migratory as some of the others. Females as large as 500 kg have

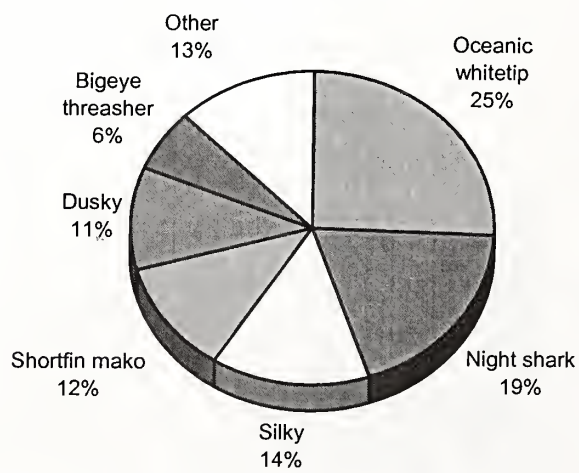


Figure 74.--Cuban artisanal shark fishermen have reported a varying species mix over time. The Cuban shark fishery in the 1950s was mostly night shark, but by the 1960s oceanic white tip dominated the catch.

been taken, but the average size in 1971-73 was about 90 kilograms. Shortfin makos do not appear to spawn or mature off Cuba as individuals under 25 kg are not taken in Cuban waters.[1200] Sport fisherman Ernest Hemingway had a special respect for the mako an wrote about it.[1201]

Night: Night sharks are another migratory species. The fishery for night shark was one of Cuba's early commercial fisheries.[1202] Cuban researchers reported declining catches in the early 1970s. but did not believe this was due to local overfishing. The best catch rates are reported in late winter or early spring. There are no notable seasonal fluctuations in the size of the fish off Cuba, but the species virtually disappears off Cuba at the end of the summer (August to October). Large ovules are noted in the ovaries during the summer (June and July). It appears to be a deepwater shark with catches mostly at 60-100 m and the species appears abundant down to 200 meters. Hooks set near the surface rarely take this species. Unlike many other shark species, night sharks appear to be gregarious. It is common to take several night sharks on adjacent hooks.[1203] Night sharks while formerly abundant, are now badly depleted off Cuba and the U.S. eastern coast where they were also once abundant.[1204]

Photo 54.--The swordfish and billfish catches of the artisanal fishermen were sometimes destroyed by sharks.

Bigeye thresher: This species is taken off Cuba throughout the year, although the highest yields are noted from August to October. The catch is composed of large adults and few juveniles. It does appear that the pups are born off Cuba. Large females with well developed embryos are common in the Cuban catch. It is likely that few young are taken because this species is not very voracious in its early developmental stages and thus less vulnerable to the fishery.[1205] Some authors describe this species as one of lesser importance.[1206]

Oceanic whitetip: This species is a permanent resident in Cuban waters and is taken year round. Catch rates are best during the winter and the beginning of Spring. There was a substantial decline in catches reported between the 1960s and 70s (appendix C11e). Cuba researchers speculate that the low reproduction rate and the non-migratory nature of the fish has allowed local fishermen to deplete it. It is a moderately sized shark, averaging about 53 kilograms with individuals as large as 130 kg reported by the artisanal fishermen.[1207]

Six gill sharks: Six gill sharks or "marrajo" *Hexanchus griseus*) are the primary target species in the offshore artisanal bottom longline fishery "fondo del alto" for sharks.[1208] It is taken in deep waters of the slope (160-300 m). Fishermen take this species close to the coast and billfish when they move a little further out. Catches have declined in recent years.[1209] This bottom dweller is not among the species taken by U.S. pelagic longline fishermen operating in the Gulf (appendix F1b).

Information on individual species of lesser importance to the fishery is as follows:

Longfin mako: This oceanic species appears to move into the Cuban coast when the females give birth. The catch rates fluctuates seasonally, but the limited available data suggests an irregular period.[1210]

Hammerheads: Three species of hammerheads occur off Cuba. The scalloped hammerhead (*Sphyrna lewini*) is the most abundant and great hammerheads (*S. mokarran*) less so. Smooth hammerheads (*S. zygaena*) are only occasionally observed. Cuban researchers have noted no significant difference in the behavior of the three species. The pattern off Cuba is similar to that of

other oceanic species in which the abundance off Cuba is seasonal, primarily during the winter months. The Cuban artisanal fishery is conducted in open waters, but close to the coast. Some of these fish inhabit the costal shelf which may explain the notable fluctuations in the catch.[1211]

Tiger: Tiger sharks are taken both on the shelf and in the open water beyond, but close to the shelf. The tiger shark is one of the most prolific taken off Cuba. Females taken off Cuba, for example, had 24-32 embryos.[1212]

Dusky: Dusky sharks are another species which declined in abundance between the 1960s and 70s. it is a migratory species only taken during winter.[1213] It is sometimes listed as one of the more important species in the Cuban shark fishery.[1214]

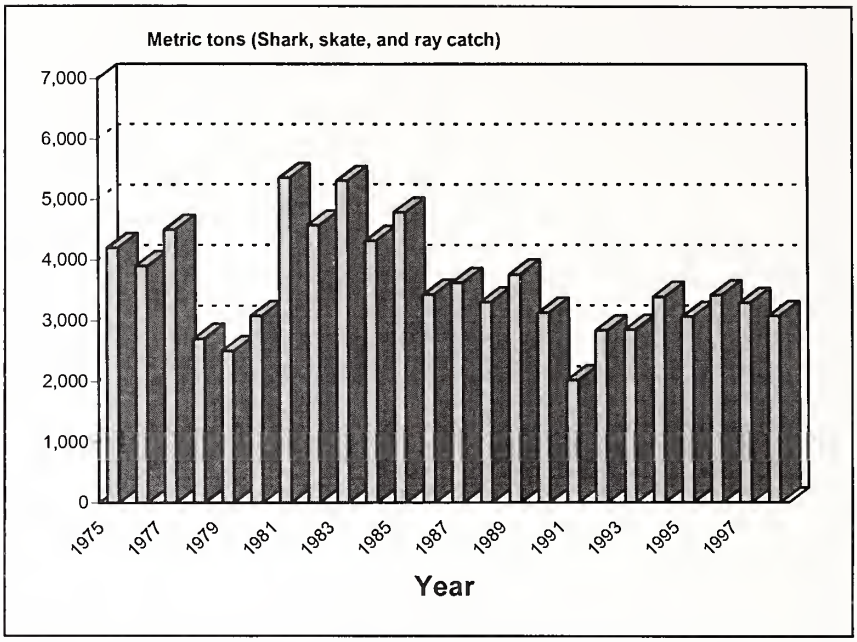


Figure 75.--Cuban fishermen have continued reporting substantial shark, ray, and skate catches despite the termination of the distant-water commercial tuna longline fishery.

Blue: Blue sharks do not appear to be important in the Cuban artisanal shark catch. Cuban researchers report it does not occur in large quantities off Cuba. Some individuals can be found off Cuba in the winter as they are seasonally displaced by the colder water moving south.[1215] Cuban researchers note that some other researchers do report blue sharks in the tropical Atlantic.[1216] U.S. fishermen confirm the Cuban reports. This species is a major component of the U.S. longline bycatch in waters north of Cuba. It does not, however, make up a major proportion of the U.S. catch in Caribbean waters. U.S. fishermen report only about 1 blue shark per 1,000 hooks in Caribbean, Gulf of Mexico and off the U.S. southeastern coast (south of 35°S) while as much as 10 times that amount in fisheries to the north.[1217]

Bignose: The bignose shark is another migratory species. Catches off Cuba are limited and highly seasonal, mostly taken during the winter.[1218]

2. Commercial operations

The Cuban commercial longline fleet beginning in the 1960s was extensively deployed in the eastern Atlantic off West Africa and in the central Atlantic. The Cubans conducted a multiple species fishery which usually targeted yellowfin, but took large quantities of sharks in many years. The commercial fishery reported substantial changes in catch patterns over time. The authors know of no published data on the species of shark taken. Limited available catch data suggests that sharks constituted about 20 percent of the catch in FAC' distant-water Atlantic operations, but a higher proportion in the more limited operations off Cuba itself appendix Cb3).[1219] The quantities involved and the proportion of the catch suggest that shark was not a mere bycatch species (appendix C11b). The fishing strategy pursued by some captains appears to have

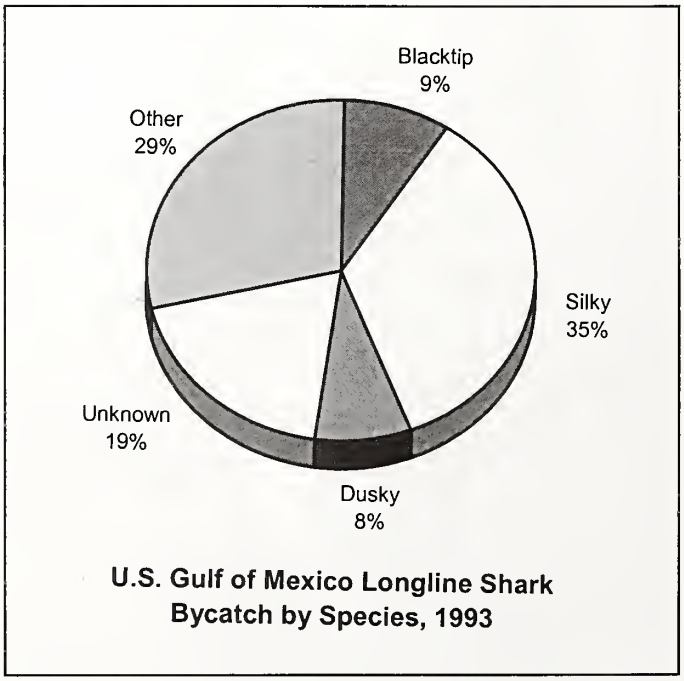


Figure 76.--U.S. longline fishermen in the Gulf of Mexico during 1993 reported taking mostly silky sharks.

become maximizing the quantity caught. A Bermuda company contracting a Cuban longliner reports that the Cuban captain persisting on landing shark even after being told that it was not wanted and could not be sold (Bermuda, appendix B6b).[1220]

The authors have found no published Cuban reports describing their shark fishing strategy. Thus insights on the Cuban fishing strategy can only be gleaned by assessing available catch data:

Bycatch rates: The authors do not have detailed bycatch rates. Some available catch composition data is available in "VI. Fleet Operations". Actual rates varied over time, but in general was about 25 percent of the catch.[1221]

Discards: Most of the shark catch was discarded in the early years of the fishery, except for a few high-value species like makos. The sharks when boated would be finned and the carcasses discarded. In the later years more of the shark catch was utilized as rices increased. The decision to operate the fleet from Havana beginning in 1987 resulted in more of the shark catch being retained, as unlike Las Palmas, three was a ready market for virtually any species.[1222]

High catch rates: The ratio the Cubans report of shark/swordfish is much higher than that reported by most longline fleets (appendix C11c).

Fishing areas: The ratio of the shark to swordfish catch in the two FAO areas suggests that the Cubans were conducting very different fisheries in the two areas. Available catch data shows that most of the swordfish catch was taken in the western Atlantic or FAO area 31 (appendix C11b). While the Cuban shark catch in the eastern Atlantic or FAO area 34 was mostly taken by commercial longliners, the catch in the eastern Atlantic may have been taken by both commercial and artisanal fisheries.

Species selection: The authors, however, have no data species of sharks the Cubans took in their eastern Atlantic fishery off Africa. FAC does not appear to have varied operations to select certain shark species. One report indicates that in the early years of the fishery only two species of shark were retained and the rest were just finned. In the late 1980s FAC began retaining more sharks.[1223]

Population trends: A Cuban researcher points out that shark catch trends may be affected by population dynamics unrelated to FAC fishing policies. Environmental factors affect abundance. The fishing effort of other countries, some with substantially larger fleets, also affect abundance. He believes that purseseining in the Atlantic has affected the abundance of yellowfin. Likewise heavy longline fishing pressure has affected swordfish stocks. Besides the environmental factors, heavy pressure on one stock may allow another species to fill the ecological niche once occupied by other species. He postulates that heavy purseseine fishing pressure on yellowfin may result in increases in other species like swordfish and sharks.[1224]

Some notable fluctuations in the shark fishery can be seen in the available data:

1970s: Most of the shark catch is reported in the western Atlantic. The longliners in the eastern Atlantic off West African report very low levels of shark bycatch (appendix C7a). In fact the levels are so low, in some years only 1-2 percent, that the data must be treated with some caution. Cuban sources report that the sharks were mostly finned and the carcasses discarded.[1225]

1981: FAC begins to report larger shark catches in the eastern Atlantic during 1981. Cuban data reported to FAO suggested a sharply higher shark bycatch (appendix C7a). The authors are unsure if the shark bycatch actually changed or the change

Photo 55.--Hammerheads are taken seasonally in small quantities by Cuban artisanal fishermen. This hammerhead was taken by Cuban and U.S. scientists during a shark research cruise in 1998.

reflects a different statistical system. Perhaps FAC began to retain more of the catch.[1226] Cuban sources confirm that the shark bycatch data reported during the 1980s was accurate, running from 19-32 percent of the catch in the eastern Atlantic (appendix C7a).[1227] Overall shark catches peak at over 5,000 t (appendix C11b).

1986: The Cuban shark catches dropped sharply in the eastern Atlantic during 1986 (appendix C11b).

1987: A Cuban researcher reports that the shift of operations from Las Palmas to Havana had an impact on the shark retention rates. The first Cuban longliners were shifted from Las Palmas to Havana in 1987 as an economy measure. Some captains who had previously discarded much of their shark catch, began retaining more, knowing that there would be a ready market for it in Havana.[1228]

1990: The Cuban shark catch in the eastern Atlantic increased again in 1990, and except for 1991, continued at high levels until the FAC ceased eastern Atlantic operations. The shark bycatch in 1990 exceeded 40 percent, more than double the level reported during the 1990s (appendix C7a). This and even higher shark bycatch levels in 1992-95 suggest that Cuban captains were actually targeting sharks. The value of shark and demand in export markets had increased during the 1980s. Most captains knew about concentrations during specific months. In addition, as the FAC longliners were now operating from Havana, there was a demand for virtually any species they landed. One Cuban observer tells the authors that the use of Havana was an important factor in expanded shark bycatches.[1229]

1991: The Cuban shark and ray fishery declined to only 2,000 t in 1991, a decline of nearly 50 percent from 1989 levels (appendix C11a). Fuel shortages may have been a major reason for this decline.

1992-94: Cuban officials beginning in 1992 began to allocate scarce fuel to the shark fishery, even though it now had to be purchased at international prices with hard currency. Since 1992, the shark and ray catch has been relatively stable at 2,800-3,400 t (appendix C11a). The level of shark bycatches exceeded 50 percent in the eastern Atlantic during 1992 and approached 70 percent in 1994 (appendix C7a).

1996: FAC ceased operations in the eastern Atlantic in 1996 and no more shark catches were reported in the area after 1996. Cuban fishermen reported 955 t of skates in the western Atlantic (FAO area 31) during 1996 and larger quantities in subsequent years. This was the first notable catch of skates reported by Cuba. It might have involved operations of FAC longliners redeployed from the easter Atlantic (FAO area 34) or perhaps just statistical readjustments (appendix C11a).

1997-98: The Cuban shark and ray catch has continued at substantial levels of 3,100-3,300 t despite the termination of the FAC eastern Atlantic fishery (appendices C11a-b) and the need to allocate fuel purchased at international prices. Research conducted in cooperation with the United States, Mexico and Cuba found that off Cuba that in bottom longline sets that there was no predominant large coastal species, but scalloped hammerhead, tiger, Caribbean reef, and nurse sharks were taken. The predominant small coastal shark was smooth dogfish. In pelagic sets, silky sharks were taken in the largest numbers, but dusky and scalloped hammerhead sharks were also reported. To the southeast off U.S. Navassa Island, the predominant shark was scalloped hammerheads.[1230]

While some data is available on overall Cuban shark catches in their commercial longline fishery. The authors know of no published account on the shark species distribution in the Cuban distant-water commercial longline fishery.[1231] Cuban sources report that during the 1980s that most of the FAC shark bycatch was finned and the carcasses discarded so as to reserve room in the hold for the more valuable species. The principal species retained was mako (*Isurus oxyrincus*).

Eastern Atlantic: The authors have no information on the species distribution of the sharks being taken by the Cubans in their eastern Atlantic fishery off West Africa. Available data suggests that significant quantities of sharks are being taken, although generally smaller quantities than in the western Atlantic (appendix C11b). Some indication of the possible species distribution of the Cuban eastern Atlantic longline fishery may be available by assessing the other longline fleets active in the area (Japan, Korea, Taiwan, and Spain), but there is very little published data on the species of sharks that they were taking.[1232]

Western Atlantic: Most of the Cuban shark catch is taken in the western Atlantic. Unlike the eastern Atlantic, however, it is not just the commercial longline fleet that is active. The authors have no precise data on how much of the western Atlantic shark catch is taken by the commercial fleet, but the artisanal fishermen land a significant part of the catch. Now dated reports indicate that artisanal longliners were active.[1233] Cuban sources report that shark catches in coastal waters increased continuously after 1962, but the catch of some species has declined since 1985.[1234] Artisanal fishermen also use set nets for rays.[1235] The quantity and composition of the shark bycatch can vary significantly by fishing grounds. The authors again have no Cuban data on species distribution, but data compiled by U.S. longline fishermen in the Gulf of Mexico (appendices F1a-b), southeastern Atlantic coast (Bahamas, appendices C3a1-

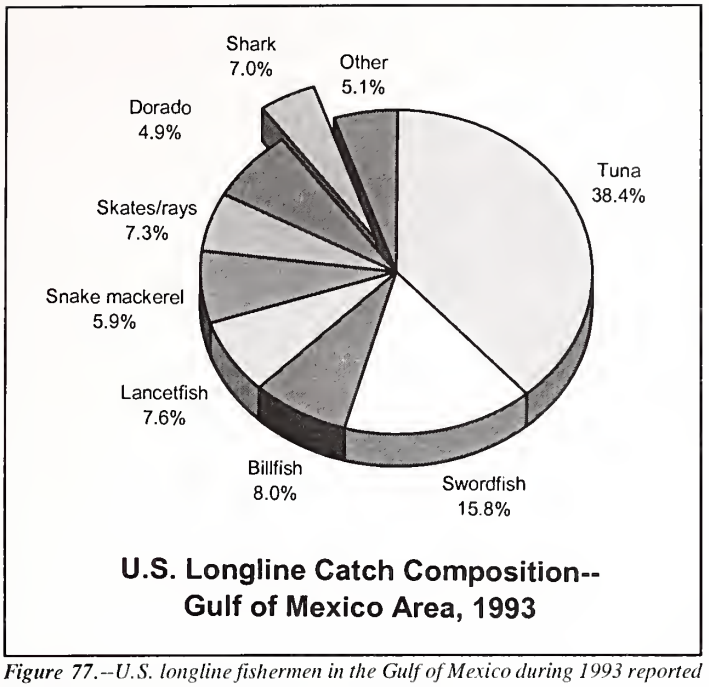


Figure 77.--U.S. longline fishermen in the Gulf of Mexico during 1993 reported that only about 7 percent of their catch was sharks.

2), and Caribbean (Puerto Rico, appendices G1a-b) provide an indicator of possible Cuban species distribution. While differences in the area, seasonality, and fishing methods can cause substantial differences in species composition, the U.S. data still provides a rough indicator of the possible species the Cuban commercial longliners are encountering.[1236] U.S. fishermen, for example, report a much lower shark bycatch in the Gulf of Mexico than off the southeastern coast. U.S. fishermen also report the following shark species: Caribbean (blue and silky), Gulf of Mexico (skates and rays and silky), and the southeastern coast (silky and dusky).[1237] In addition, the Cuban artisanal data described above provides an indicator of possible commercial catches in coastal waters, although gear and fishing strategy differences between the commercial and artisanal fleet may result in varying species distributions.

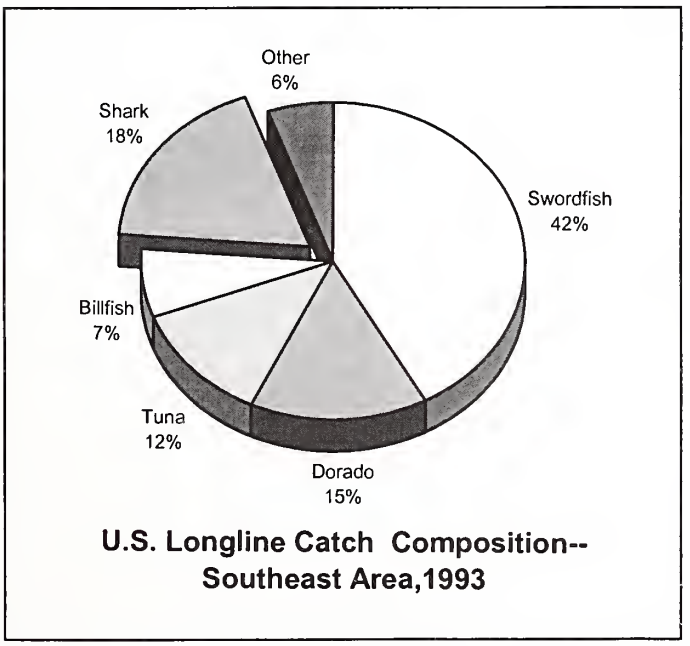


Figure 78.--U.S. longline fishermen in the Atlantic, off the southeast cost reported that 18 percent of their catch was shark, more than twice the level in the Gulf of Mexico.

D. Other finfish

Cuban sources have reported a variety of other species in the bycatch of the Cuban longline fisheries, including needlefish.[1238] The authors know of no Cuban publication describing the bycatch in any detail. The limited available reports usually only describe the major species taken in the fishery.

A cooperative research program conducted by the United States, Mexico, and Cuba provided detailed data from sets all along the coast. Researchers reported that in demersal longline sets, the predominant incidental catch was amberjack (*Seriola dumerili*) and in pelagic sets it was great barracuda (*Sphyraena barracuda*)[1239]

U.S. catch data provides some indication as to what other species the Cubans may encounter.[1240] U.S. fishermen in the Gulf of Mexico during 1993, for example, reported a substantial catch of lancetfish (8 percent) as well as small quantities of snake mackerels (such as oilfish), dorado, and wahoo (appendix F1b). U.S. fishermen off the U.S. southeastern coast report a substantial dorado catch (15 percent), and smaller quantities of snake mackerels, lancetfish, and wahoo (Bahamas, appendix C3a2). U.S. Caribbean fishermen report a substantial dorado (11 percent) and lancet (7 percent), and snake mackerel (7 percent) catch, and smaller quantities of other species (Puerto Rico, appendix G1b).

Cuban fishermen report catches of various mackerels. Most of the catch is cero (*Scomberomorus regalis*), Spanish (*S. maculatus*), and king (*S. cavalla*). They are generally taken together in mixed catches, primarily along the southeastern coast. Spanish and king mackerel constitute most of the catch which is taken by trolling, but gillnets are also employed. They are popular food fishes in Cuba.[1241]

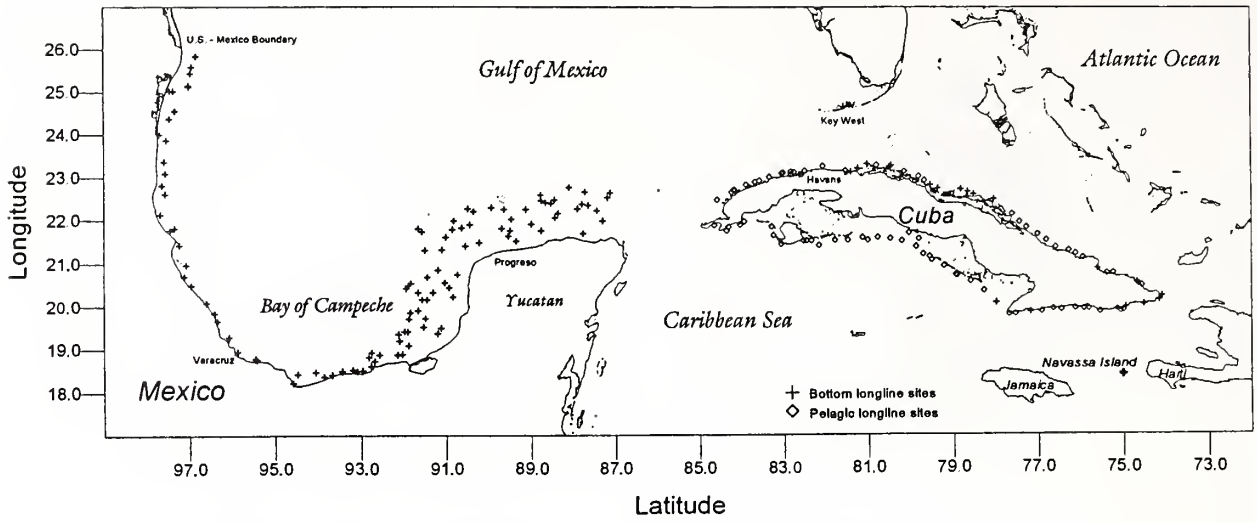


Figure 79.--Cooperative shark research (U.S., Mexico, and Cuba) in 1998 provided details not only on sharks off Cuba, but other species as well that are taken in both demersal and pelagic longlines.

E. Turtles

1. Background

Sea turtles have been exploited in Cuba since pre-colonial days. Cuban sources report that indigenous populations had sophisticated, innovative capture methods, involving tethered remora. The Indians also took turtles as they came up on the beaches to nest.[1242] The Spanish colonists reported substantial catches in the earliest era of colonization. Turtles were so plentiful that they were for a time used to feed slaves.[1243]

The first measures known to the authors taken by the Cuban Government to regulate turtle catches were in 1936, as part of the country's first Ley General de Pesca (General Fisheries Law). The Law established a closed season during the reproduction period.[1244] Since that time, Cuban officials have issued numerous regulations governing turtle exploitation. This includes regulations adopted both before and after the Revolution.[1245] The Government in 1994 instituted a total ban on taking turtles, except for the quota given to the traditional fishing communities.[1246]

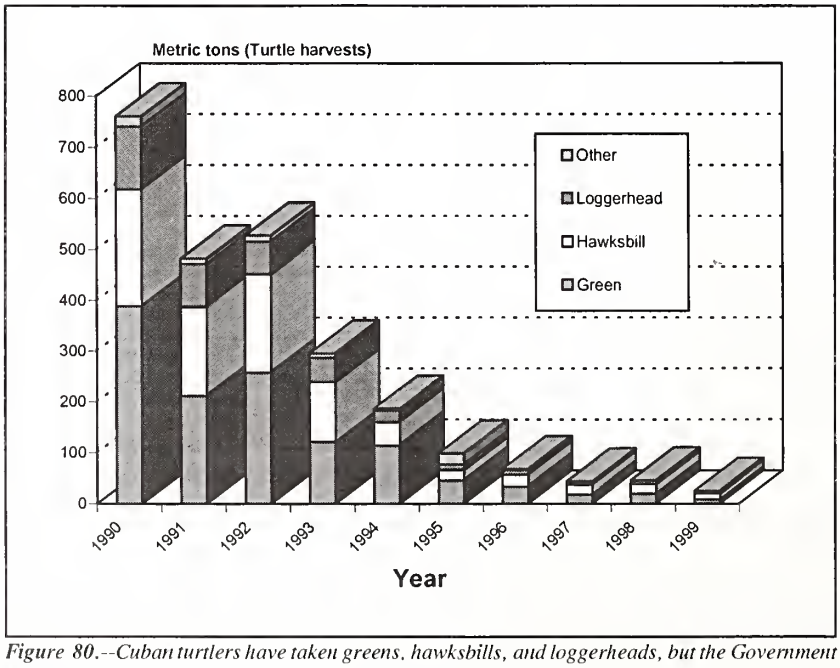


Figure 80.--Cuban turtlers have taken greens, hawksbills, and loggerheads, but the Government has reduced catches to very low levels by strict controls on directed fisheries.

The Cuban Government began the formal management of the sea turtle fishery in 1968.[1247] Through much of the 1970s and 1980s, the catch was 700-900 t annually, almost exclusively greens, loggerheads, and hawksbills. Somewhat higher catches of 1,000-1,200 t were reported in 1985-86.[1248] The Cuban turtle catch began to decline below the 700 t level in 1989 and by 1994 had fallen to only 200 t (appendix F2c1). It is difficult to assess to what extent the falling catches were due to declining populations as opposed to Cuban management limitations on catches. Notably a significant decline in the Cuban turtle catch, occurred during

1986-89 before the Government began to strictly limit effort in the 1990s. Much of the falling turtle catches in the late 1980s was the result of declining loggerhead catches.

Cuba began phasing down its turtle fishery in 1990. This was the same year that Cuba joined CITES. The authors had thought that Cuban actions to reduce its turtle harvest were due to its participation in CITES and declining turtle stocks. CITES would be, however, only relevant to international trade which would primarily affect hawksbills because the shell of that species was being exported. Some environmentalists believe that the Cuban decision to reduce efforts on turtles was related to the decision to join CITES and the decline in sea turtle stocks. Cuban officials insist, however, that their decision to reduce effort on turtles was not due to either CITES or declining turtle stocks.[1249] Officials report that their voluntary reduction in turtle catches was a domestic decision to divert fishing effort to export oriented fisheries that could generate more foreign currency earnings.[1250] Cuban officials were certainly hard pressed in the early 1990s to increase export earnings. Cuban authorities appear to have reduced fishing effort on all sea turtles, including greens and loggerheads, as well as hawksbills.

Available data shows substantial catch declines in overall turtle catches during the 1990s.
1990: Cuba joined CITES in 1990.
1991: Catch data compiled by the Cuban Government shows a substantial decline in 1991.
1993: Very significant reductions n the turtle catch began in 1993. This would be the first year after Japan removed its reservation to CITES, suggesting that CITES may have had some impact on Cuban policy. Cuban officials insist, however, that this was not the case and it was the diversion of fishing effort to export fisheries that was the primary factor for the reduced turtle catches.[1251] In addition to the Cuban decision to divert fishing effort, the fuel crisis of the early 1990s may have also limited catches.[1252]
1994-96: Officials introduced further measures in 1994-96 which expanded the protection regime.[1253]
1997-98: The Cuban turtle catch in 1997 and 1998 has been less than 50 t (appendix F2c1). Cuban authorities have in fact limited turtle catches to a total of 50 t (all turtle species combined) annually. There are also minimum sizes.[1254] Catches at these levels are due to strict Government catch levels. Environmentalists would argue that declining stocks are another factor and that Cuban catch levels were unsustainable. Foreign environmentalists are even concerned about the lower turtle catch levels reported by Cuba on these endangered animals. Even at about 50 t, they are much larger than reported by any other Caribbean island. Cuba officials question the concern of some environmentalists and reports of declining stocks.[1255]

The authors note that throughout this chapter that we have attempted to follow the debate on the turtle issue between foreign researchers and environmentalists on one side and Cuban Government officials and other foreign researchers--mostly contracted by the Government. The reader might be tempted to ask about Cuban environmentalists. There are of course Cuban government employees which are interested in the environmentalist. There are in fact a wide range of excellent environmental programs conducted by the Government to safeguard a range of endangered species and habitats. There are not, however, any independent Cuban NGOs. Thus while there may be discussions within the Government, once a decision is taken, there are no Cuban groups to question those decision.

The authors in preparing the initial draft of this section had assumed that declining turtle stocks in the Caribbean had been a strong motivating force behind the Cuban limitations on fishing effort, especially those imposed during the 1990s. The authors have noted that in the past some developing countries have not been given adequate credit for important efforts to protect wildlife with the often limited resources at their disposal. The authors thus sought to credit the Cuban management and research program as a laudable, if considered incomplete by some environmentalists, effort to protect declining stocks of these endangered animals. Cuban reviewers, however, objected to the suggestion that "declining stocks" were a important part of their management decisions.[1256] Their assertion is certainly influenced by Cuban Government efforts to downlist hawksbills from CITES appendix I. (See b. hawksbills" below.) Cuban officials report that their research shows different results than that reported by many other turtle researchers. The Cubans report that hawksbill stocks are not declining and that there is no indication that green turtle stocks are declining. There is some concern over loggerheads.[1257]

The most prized species taken by the Cuban turtles was and continues to be the hawksbill or "carey". In addition to providing meat used domestically, hawksbills shells were exported as part of the "turtle shell" trade, which in Japan is known as "bekko". Most of Cuba's turtle shell, between 1973 and 1992, was exported to Japan, which held a reservation to CITES until 1992.[1258] Once Japan dropped its reservation, very sharp reductions were reported in the Cuban turtle catch. The green or "verde" and loggerhead or "caguama" are common in Cuban waters and also taken in substantial numbers by Cuba. Local

researchers also reported leatherbacks as occurring in Cuban waters, but this species has been of less commercial importance than the three more common species (appendix F2a). Olive Ridleys are rarely seen off Cuba and elsewhere in the Caribbean and the infrequent appearance seems to be the result of individuals wandering from their normal migratory pattern.[1259] Cuba sources indicate that the country has important nesting beaches for hawksbills, loggerheads, and greens (appendix F2a), but this has not been well documented.[1260]

***Photo 56** --The controversy over hawksbills has been widely reported in recent years. Longline interactions, however, probably are most prevalent with loggerheads.*

The CIP initiated a turtle research and monitoring program in the early 1980s. Cuban sources report that the program greatly expanded in the 1990s with international cooperation, including FAO and other countries, such as Australia, Japan, Mexico, and Caribbean countries. Reports suggest that some U.S. researchers were interested in participating, but most were not permitted to by Cuban authorities. Details on the Cuban selection process are unavailable.[1261] The CIP expanded its turtle research and management program in 1996. The program is now called the Programa Nacional de Tortugas Marinas (PNTM). The Cuban Center for Marine Resources in 1999 reported initiating a project to study sea turtles at Biosphere Reserve Península de Guanahacabibes. The Reserve is located at the extreme western tip of Cuba. The study is a joint collaborative project with the Facultad de Biologia of the UH, the CIP at MIP, and a Provisional Agency at the Ministry of Science, Technology, and Environment. Cuban researchers report that green and to a lesser extent loggerheads nest at the Reserve.

Cuban officials since 1994 have only allowed commercial exploitation at the Isla de la Juventud/Isle of Pines (Cocodrilo) off the southeastern coast and Nuevitas (Punta Ganado, Cayo Romano, Cayo Guajaba, and Los Pinos) off the northeastern coast. The turtles are taken from August 1 to April 30 at all sites. The closed season extends from May 1 to July 31, but is sometimes extended further if nesting of greens and loggerheads is still underway.[1262] The turtles are taken by communities that have for the past century focused on turtle exploitation.[1263]

Cuban researchers report that one unintended consequence of the decision to restrict the turtle fishery to a few sites has been the loss of country-wide data. When the turtle fishery was country-wide, there was more extensive contacts between turtle researchers and fishermen all over the country. While there were clear conservation advantages to limiting the fishery, one of the disadvantages is that research and intensive monitoring is now restricted to only two sites. All tags used to be returned to MIP. Now fishermen can return the tags directly to the country of origin.[1264] In actual practice, however, because turtles can not be legally taken outside of two authorized sites, few tags are returned by fishermen who take turtles incidentally. Many fishermen are reportedly concerned that legal action may be taken against them by Cuban authorities.

2. Species

a. Greens

Green sea turtles (*Chelonia mydas*) are the species taken in the largest numbers by Cuban turtles (appendix F2c1). Tag returns show greens originated from Bermudian and Caribbean nests but greens from the south Atlantic also move into the Caribbean.[1265] The species nests at several locations along the Cuban coast. Important nesting beaches, for example, are located at the Biosphere Reserve Península de Guanahacabibes at the extreme western tip of Cuba, especially Antonio and El Resguardo).

Catches of green turtles during the 1970s and 80s generally ranged from 200-400 tons. The 1985 catch exceeded 500 tons.[1266] Observable catch patterns in the available data suggests that Cuban authorities increased fishing effort in 1968 over historical levels, but did exercise some limits during the 1970s and 80s.[1267] Cuba began to significantly reduce effort on turtles in the early 1990s. There appears to have been a generalized effort affecting catches of all turtle species, including greens. Catches of greens fell below 200 t in 1993. Catches have been reduced to only 18-20 t in 1997-98 (appendix F2c1). Given the sharp decline in the catch after 1990 in line with hawksbills, the catch reductions appear to be primarily Cuban management decisions. The extent to which declining stocks of green turtles may also be affecting the catch decline is unknown. Cuban officials report that their CPUE data from the commercial fishery did not indicate declining stocks.[1268] Cuban officials describe that the decision to reduce the catch as largely an economic one to divert available fishermen and boats to more profitable export oriented fisheries. Officials report that fishermen, in some cases men working in the fishery up to 50 years, complained that turtles did not appear to be "declining in numbers" when MIP imposed strict catch limits during 1994-95.[1269]

b. Hawksbills

Hawksbills (*Eretmochelys imbricata*) in recent years have proven to be the most controversial turtle species associated with the Cuban fishery. Hawksbills off Cuba both nest and forage.[1270] The species feeds on or around reefs, often eating sponges. Available data show that hawksbills are highly migratory. Hawksbills off Cuba originate from both Cuban nests as well as nests in many other Caribbean countries. Both genetic and tagging studies provide data on the origins and migratory movements of hawksbills.

Genetic studies: Genetic analysis indicates that hawksbills foraging off Cuba primarily nest (nearly 70 percent) at Cuban beaches. There are, however, also substantial numbers of turtles from the Cuban foraging population that genetic studies show to have emanated from beaches throughout the northeastern and northwestern Caribbean (including Mexico, Belize, Puerto Rico, the U.S. Virgin Islands, and Antigua), but not Barbadian and Brazilian beaches.[1271]

Tagging studies: Studies with satellite transmitters are providing detailed data on migratory routes in the Caribbean. Animals tagged with transmitters in Cuba have dispersed to the Cayman Islands, Honduras/Nicaragua, Belize/Colombia, Jamaica/Montserrat/Guadeloupe, and Yucatán, traveling distances as much as 2,450 kilometers. In two cases the turtles left Cuban waters only to return. The tracks of four other were within Cuban waters.[1272] Hawksbills tagged in other countries have also been taken off Cuba.[1273]

The Cuban Government in 1968 initiated formal management of the turtle fishery which permitted about 5,000 hawksbills to be taken annually. Officials discussed a more restrictive management plan during the 1970s, but no firm decisions were taken. The CIP held workshops with the fishermen in the 1980s to promote a controlled fishery and educate the fishermen as to the dangers of over fishing. The 1990 catch was 229 t, but was gradually reduced to 115 t by 1994 (appendix F2c1). Catches in 1997-98 were 18-19 tons.

Cuban officials maintain that their interest in down listing hawksbills from CITES Appendix I to Appendix II (allowing the export of hawksbill products) is, in part, to sustain small remote communities which have traditionally taken turtles.[1274] The Cuban restrictions on turtle exploitation were implemented to redirect the activities of these communities to more profitable fisheries.[1275] The regulations in 1996 continued to permit the take of 500 hawksbills annually. There are also minimum sizes.[1276] Most of the turtles taken are females, nearly 80 percent--although this varies seasonally and by fishing area.[1277]

Cuban hawksbill catches during the 1970s and 80s generally ranged from 200-300 tons. The 1985 catch was somewhat higher because capture restrictions were suspended that year. The stability of these catches and the 1985 spike when restrictions were suspended suggests that the Government was enforcing at least some restrictions.[1278] Australian researchers working with the Cubans, in contrast with many other turtle researchers, do not believe that hawksbill stocks are declining, but rather the opposite. The impact of the Cuban exploitation, however, has been of great

concern to many turtle biologists who are worried about the status of the hawksbill populations. Turtle researchers and environmentalists on many Caribbean islands are especially concerned because a substantial number of the turtles caught were from nesting populations from other Caribbean islands.[1279]

Cuba reduced hawksbill exploitation levels in the 1990s. The country reported substantial hawksbill catches of 212-258 t in 1991 and 1992, but subsequently reported significantly lower catches, 122 t in 1993 and 115 t in 1994. The 1997-98 hawksbill catches were only 18-19 tons (appendix F2c1). The authors have noted various views as to the reason for this major decline.

Cuban researchers: Cuban and some foreign researchers and wildlife management specialists[1280] report that the decline in Cuban turtle catches was not due to any decline in the population. Cuban researchers report that the CPUE results from the Isle of Pines (one of the two traditional harvesting sites) suggest an increasing population. In addition, the Cubans report increased nesting activity from monitored beaches at Doce Leguas since authorities implemented a new monitoring program in 1997. Cuban researchers also report that the mean size of hawksbills being caught is stable or increasing.[1281] Cuban officials insist that the decline was a due to redirecting the work of the turtles to more profitable, export generating fisheries and a purely economic decision. Officials insist that CITES and declining stocks were not a factor.[1282]

Environmentalists and foreign researchers: Many environmentalists and most non-Cuban turtle researchers believe that hawksbill stocks are declining and that this has affected long-term Cuban catch trends. Some environmentalists also believe international efforts to protect the species have also been a factor in declining Cuban hawksbill catches. As mentioned above, Cuba joined CITES in 1990. Notably it was only after Japan removed its CITES reservation in 1993 that the most substantial declines in hawksbill catches occurred (appendix F2b). Some environmentalists are unconvinced that this was mere coincidence.

c. Loggerheads

Loggerheads or "caguamas" (*Caretta*), are the third species commercially exploited in Cuba. Available data suggests that, of the three species heavily targeted by Cuban turtles, they are the species most severely depleted. Cuban researchers report that local fishermen confirm that the number of loggerheads has declined in the commercial harvest.[1283] There is some loggerhead nesting at the Biosphere Reserve Península de Guanahacabibes. Another important nesting site for loggerheads and greens is San Felipe Keys in the Canarreos Archipelago, along the southwestern coast.[1284] Cuban nest monitoring of loggerheads at the Isle of Pines indicate stable nesting.[1285] Some turtle researchers consulted by the authors were surprised at this finding and were interested in seeing the actual data which is not available to the authors of this report. Loggerheads do not forage in the shallow coral reef habitats and other inshore areas so the Cuban coastal observations cannot be used to assess abundance. The turtle catches and nesting observations is the only available Cuban data on abundance.[1286]

Cuban officials indicate that they limited fishing effort on turtles during the 1970s and 80s. An analysis of Cuban turtle catch data confirms this, especially the stability of green and hawksbill catches and the 1985 spike in the catch when restrictions were removed (appendix F2c1). Notably during this period, loggerhead catches began to decline well before Cuban officials introduced more restrictive protective measures, sharply limiting exploitation during the 1990s. Loggerhead catches declined from 320 t in 1980 to 142 t in 1989 (appendix F2c1).[1287] This suggests that a dwindling population was adversely affecting catches despite Cuban management efforts.[1288] The loggerhead catch in 1997-98 was 7 t annually.

The Cuban research effort has given considerable attention to loggerheads. Biological data from loggerheads taken in the fishery were collected from the research and monitoring program initiated by CIP in the early 1980s. In addition, a study on loggerheads nesting was initiated in 1982 at El Gunnel on the southern coast of the Isla de Juventud.[1289]

Cuban and American turtle researchers, despite the serious political differences between the two countries, do exchange some information. U.S. researchers are investigating the migratory paths of loggerhead turtles ("caguamas") by attaching satellite transmitters. Some of the turtles and transmitters have been disappearing off Cuba.[1290] Cuban turtle researchers have offered to look into the problem, but to date have not provided any information as to what is happening to the turtles and transmitters.[1291] One observer notes that Cuban officials have confirmed the turtles were not taken in the traditional fishery because the authorized turtles carefully record all details connected with the individuals taken.[1292] The turtles with transmitters appear to have been taken incidentally by other Cuban fishermen.[1293] This strongly suggests that there are Cuban fisheries which result in incidental turtle takes. These occurrences can not be used to draw any valid

conclusions as to the level of such interactions, but the frequency given the small number of turtles affixed with transmitters is troubling. In addition, one source confirms that turtle meat "finds its way into the black market" and sometimes into the "paladares", suggesting that in addition to the incidental catches that there may be some illegal fishing as well.[1294]

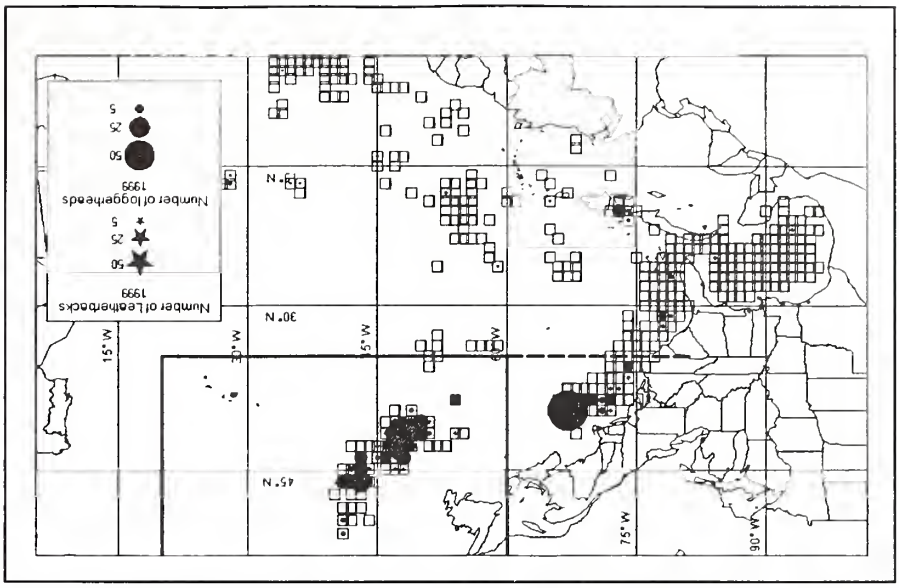


Figure 81.--U.S. longliners reported large numbers of loggerhead interactions off the northeast coast and on the Grand Banks in 1999. Some interactions were also reported off Cuba. Brewster-Geisz

d. Leatherbacks

Little information is available on the presence of leatherbacks in Cuban waters. The CIP in 1972 did identify leatherbacks as one of the four species which occur off Cuba and were of economic importance.[1295] Cuban researchers in 1998 report that the species is "uncommon" in their waters. Leatherbacks probably forage off Cuba, but there are only two reports of nesting (appendix F2a). Cuban leatherback catches are believed to be limited, in part because they do not seem to commonly move into coastal waters. The species is present in open waters off Cuba.[1296] FAO does not list Cuban leatherback catches separately, but has a basket data for other marine turtles (appendix F2c1). The fact that leatherbacks are not common in coastal waters would seem to partially explain limited Cuban catches (appendix F2c1). Reports of interactions by U.S. longline fishermen, however, show that the species is present in Cuban waters (appendix F2b). The level of interactions suggest that the species may not be "uncommon" as reported.

3. Government's interests

The Cuban Government has mixed interests in connection with turtles and hawksbills in particular. Cuba policies reflect this dichotomy of interests.

Protection: The Cuban Government is interested in protecting sea turtles as its efforts described above attest.[1297] Some researchers report that the Cuban Government has made a significant contribution to the conservation of hawksbill turtles and has compiled an impressive set of data on many aspects of sea turtles.[1298] Some U.S. researchers complain that Cuban researchers do not freely share their data with other researchers. The authors are unsure how to interpret these complaints which could be due to a variety of causes.[1299]

Utilization: Cuba has also expressed an interest in utilizing the hawksbill resource in what it believes is a sustainable utilization of the available resource. Possible sources of earning hard currency are of special interest to the Cuban Government given its severe balance of payments problem.[1300]

Social concerns: Cuban officials have also expressed concern over the welfare of the communities involved in the traditional turtle fishery.

Economics: Hawksbill shells if exported would add considerably to the economic value of the traditional catch which is currently consists primarily of meat sales in the domestic market. Cuba's commitment to sea turtles, however, is evident even in its use of the meat. As mentioned above, Cuba has a booming tourist industry. Turtle meat could easily be sold to tourist hotels and restaurants for dollars at high prices. Yet the Government maintains that it only delivers the butchered meat to hospitals and old age homes at low prices in pesos. The Cubans justify this for health and social/cultural reasons.[1301]

Foreign interests: It should also be mentioned that Cuba is not the only country concerned in efforts to downlist hawksbills so that shells can be marketed internationally. The Japanese bekko industry with support from the Japanese Government is providing money to the Cubans for their turtle research program. Japan as a CITES member does not import bekko, but there continues to be a small trade in domestic bekko.[1302] Unidentified Japanese organizations would clearly like the CITES rules changed so that Japan can import bekko to expand the current industry. The Japanese funds are being used by the Cubans not only for the research program, but to hire foreign consultants and for publications.[1303]

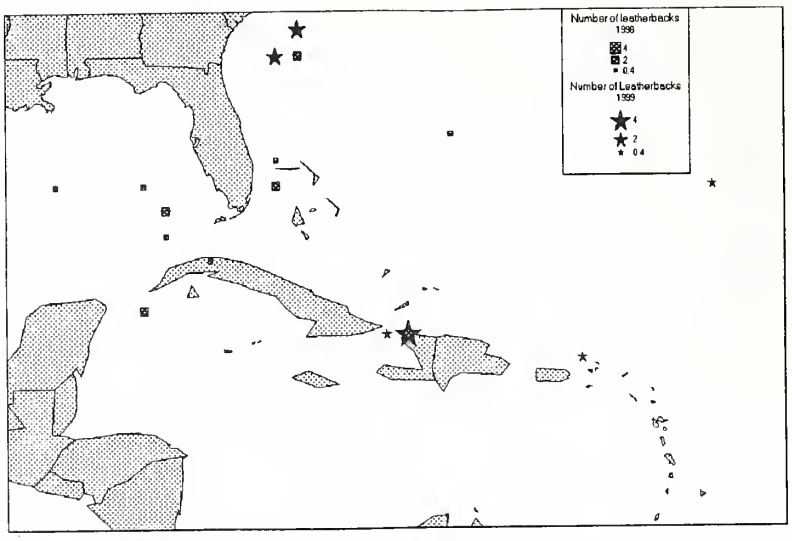


Figure 82.--U.S. longliners during 1998-99 reported leatherback interactions at various locations in or near Cuban waters. Most were reported in the Windward Passage between Cuba and Haiti. Brewster-Geisz

Cuban export sales are not currently possible because hawksbills are listed on CITES Appendix I as an endangered species. As a result, Cuba has proposed down listing hawksbills from CITES Appendix I to Appendix II. This would allow Cuba to export hawksbill products to Japan. The Cubans would like to export existing shell stockpiles (7 t) and afterwards up to 500 hawksbills shells annually.[1304]

The Cuban proposal to sell existing shell stockpiles was discussed at the 2000 CITES Meeting of Parties. The proposal was strongly criticized by environmental groups, including most Caribbean environmentalists.[1305] The United States, one of the range states, also opposed the Cuban proposal because U.S. scientists have concluded that hawksbill populations are endangered throughout their range.[1306] Caribbean hawksbills have been the subject of considerable attention and most researchers express concern with the status of the resource.[1307] Many turtle researchers in the region, including Mexican and reportedly even some Cuban researchers, were concerned with exploitation of hawksbills in the Caribbean.[1308] Some other researchers supported the Cuban proposal.[1309] Many governments in the region also questioned the U.S. position.[1310] A majority of CITES parties, including most Caribbean governments, were in fact sympathetic to the Cuban proposal.[1311] The proposal was not passed, however, as a two-thirds vote was needed.

Cuba is not the only Caribbean country where turtle products are being used, although there are special aspects connected with the turtle trade in Cuba. Turtles are still fished and products sold legally in several Caribbean countries.[1312] Cuban sources also point out, with some validity, that domestic trade continues in many Caribbean countries even where legislation prohibits it.[1313] Caribbean countries generally have limited enforcement capabilities. Most can not realistically prevent the subsistence take of turtles. Caribbean Governments can, however, generally prevent open sales in stores and markets. On the islands that prohibit any turtle take, turtles are no longer openly sold. This trade in the past attempted to target tourists, although rising environmental consciousness and import restrictions in many of the countries where Caribbean tourists originate is limiting tourist sales. Cuba is the Caribbean country where the utilization of turtles is most organized and where the largest number of individuals are taken. Cuba is also the only country where the Government is directly involved.

An important factor to consider in the hawksbill discussion, regardless of the current status of stocks, is market considerations. As sales of product like turtle shell (bekko) drop to a minimal level, the industry and market may disappear--thus ending incentives for poaching. Even controlled sales help sustain the bekko industry, thus continuing interest in the product. Supplying a luxury item in small quantities may, in fact, actually stimulate demand. Resulting increased prices may generate renewed interest and provide incentives fueling illegal catches and sales. It can also significantly increases the cost and difficulty of enforcement. Available information from many Caribbean island countries does indicate that Caribbean hawksbill populations have been decimated--largely because of the formerly lucrative export trade.[1314]

4. Fishery interactions

Cuban and cooperating foreign researchers have given only limited attention to the fisheries bycatch issue. It is clear that there are turtles interactins in several Cuban fisheries. Cuban publications have mentioned turtle interactions in various fisheries. The normal practice was to use the turtles for food. One 1969 article, for example, desribes "delicious fillets" produced from a turtle.[1315] The authors, however, know of no data on turtle ineractions or verifiable accounts of what happens to turtles taken indicentally.

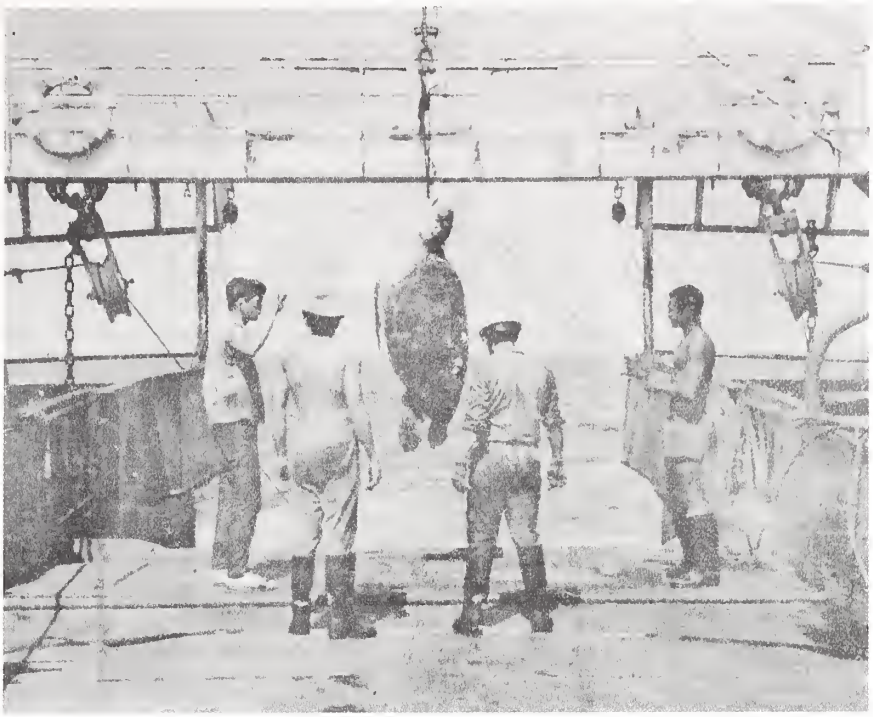


Photo 57.--Cuban fishing boats like this trawler have taken turtles incidentally. No information is currently available on the level of interactions or the disposition of the turtle bycatch.

Published Cuban data on bycatch is virtually non-existent. CIP researchers note that some bycatch work has been done. One CIP researcher addressed the topic to a very limited extent during the early 1980s.[1316] Another CIP researcher also reports some work on fishery interactions, but the resulting data has not been widely released.[1317] Some limited information is available, primarily anecdotal reports from researchers working with turtles--mostly shore-based researchers. The authors have been unable to find any published Cuban reports describing bycatch trend in fisheries like longlining or shrimp trawling where interactions would be expected. The authors have no data on Cuban longline interactions with turtles and have unable to find published Cuban data on such fishery interactions. One foreign researcher working on Cuban turtles believes that the Cubans do have data on interactions, but feel a major research effort is not justified.[1318]

Some sketchy observations concerning possible Cuban interactions with turtles are possible based on the limited available information and data from U.S. fishermen working off Cuba and adjacent areas are possible.

a. Cuban coast

Turtles both forage and nest off Cuba. Turtles species vary greatly in their vulnerability to fisheries. Turtle biologists in the Atlantic are most concerned about pelagic longline interactions with loggerheads and leatherbacks. Of the two, loggerheads are the species taken in the greatest numbers by Cuban turtles. While Cuban turtles take far fewer leatherbacks, some available bycatch data suggests there are interactions with longlines, especially in the Windward Passage. The rapidly declining Atlantic population of leatherbacks make even minor interactions of some importance. While longline interactions with greens and hawksbills may be rare, interactions with other artisanal and commercial fisheries may be significant.

Hawksbills: Hawksbill interactions with pelagic longliners appear to be rare anywhere, probably reflecting their feeding on sponges in coral reefs.[1319] These are areas where longliners are unlikely to set. In contrast, hawksbills are vulnerable to entanglement in a variety of gear deployed in coastal fisheries, such as set nets. The set nets used in the inshore stingray fisheries is of some concern because of turtle entanglements.[1320] There may also be interactions with Cuban snapper boats which target snapper and grouper using hook and lines in reef areas.

Greens: U.S. longline fishermen in the wider-Caribbean do not report serious interactions with green turtles. Foreign longline fishermen in the Mediterranean also do not report interactions with greens. Presumably the same is true in Cuba. Interactions with various other Cuban artisanal and commercial fisheries, however, may be of some importance.

Loggerheads: Substantial loggerhead interactions are reported by U.S. fishermen, especially on the Grand Banks. U.S. fishermen also report interactions off Cuba--especially in the Windward Passage between Cuba and Haiti (figure 81 and appendix F2b). Foreign fishermen in the Mediterranean also report that loggerheads are severely affected by longline interactions.[1321] The loggerheads are hooked in the mouth, suggesting that they are attracted by the bait.[1322] This is a species that does occur off Cuba and it can be expected that Cuban longliners may also encounter loggerheads.

Leatherbacks: U.S. longline fishermen also report interactions with leatherbacks. These interactions

include some in or near Cuban waters (figure 82 and appendix F2b). The level of interactions are in fact notable for a species that does not appear to be as abundant as loggerheads in Cuban waters. These large reptiles are usually entangled in the line, possibly attracted by lightsticks. Potential Cuban interactions may be less intensive because of the declining Cuban longline fishery and the fact that Cuban fishermen do not use lightsticks. However, as the level of Cuban fishing may be greater, the absolute number of interactions may be larger. The authors, however, have no information on actual Cuban fishery interactions with leatherbacks.

Inadequate information is available from fishermen and observers for the authors to make any valid assessment of turtle interactions with Cuban longline and other fishing gear. Some general observations, however, are possible on potential interactions.

Cuban data: The Cuban 1996 PNTM effort included an effort to reduce fishery interactions with sea turtles. The Cuban effort has focused on the snapper fishery off hawksbill nesting beaches. The authors have no information about Cuban efforts to reduce turtle interactions in other fisheries known to affect turtles. Cuban publications which have described the PNTM in some detail, do not address the bycatch issue.[1323] This is potentially a serious limitation of their overall effort. These fisheries are listed here not because the authors have data to present, but primarily to identify fisheries which should be considered in assessing Cuban bycatch trends.

Unknown fishery: As reported above, turtles with radio transmitters have disappeared off Cuba. Some have been tracked moving inland. This almost certainly means that the turtle has been taken in a fishery and either the turtle or transmitter transported inland.[1324] The number of turtles involved are very small because the numbers of turtles with radio transmitters are limited. This does strongly suggest, however, that an unknown Cuban fishery, without Government authorization, is taking turtles.

Snapper: CIP observers accompany snapper boats operating off the two turtle exploitation areas (Isla de Juventud and Nuevitas). The observers are trained to revive hooked turtles if necessary. Their major concern is the snapper ("pargo") fishery. The "cochamberas" deployed for pargo have reported a small turtle bycatch, about 4 or 5 annually, although none were reported in 1999. The CIP works with the fishermen to develop fishing strategies that avoid turtle interactions without substantially reducing the snapper catch.[1325] Turtle interactions are also reported with set nets targeting snapper.[1326]

Shrimp: The Cuban shrimp fishery is not a large one, but does account for 2,000-3,000 t of shrimp annually and thus involves several trawlers.[1327] Cuban shrimp trawl fishermen report no turtle bycatch.[1328] The authors know, however, of no published Cuban study confirming this.[1329] Some observers report "relatively few" turtles are taken in the shrimp trawl fishery.[1330] The authors are unsure, however, as to the data on which that conclusion is based.[1331] Given the presence of foraging and nesting turtles off Cuba, the authors consider it extremely unlikely that the shrimp trawl fishery is conducted without turtle interactions. This is especially significant because Cuba is one of the few Latin American countries that have not installed Turtle Excluder Devices (TEDs) on their shrimp trawlers. Most other countries have concluded that an effective turtle protection program requires not only efforts to protect turtle nesting beaches, but also turtles at sea. Quantifying the rates of turtle bycatch off Cuba, and the species involved, would assist efforts to understand the regional extent of turtle bycatch in the Caribbean.

Swordfish: Cuba has deployed artisanal swordfish longliners off northwestern Cuba, although current activity appears limited. (As noted above the artisanal swordfish longliners also took billfish and shark.) CIP researchers in casual observations have not noted any turtle bycatch reported by these artisanal longline fishermen.[1332] The authors, however, know of no published Cuban study describing turtle interactions or bycatch. The authors are cautious about reported claims that artisanal longline fishermen do not encounter turtles. Similar reports are noted by shrimp trawl fishermen which are almost certainly erroneous. Thus the authors believe that the lack of reports of longline interactions with turtles can also not be taken as proof that such interactions have not occurred. As with the shrimp trawling, quantifying the interaction rates and species involved would assist regional efforts to understand the extent if bycatch mortality.

Sharks and rays: While the artisanal swordfish longline fishery has declined, Cuba does continue to take substantial quantities of sharks and rays (appendix C11a). The authors do not have detailed information on the gear being utilized to take sharks. It is likely that at least some of the gear deployed will result in turtle interactions. Set nets for rays, for example, are known to take turtles.[1333] Although current information is lacking, artisanal longlines have been employed and they would also probably take turtles. No valid assessments are possible, however, because of the lack of information on these fisheries.

U.S. data: U.S. fishermen report some sets near Cuba, mostly off the western coast in or north of the Yucatán Channel and off the island's eastern coast in or near the Windward Passage. Data available for 1998-99 show few interactions near the Yucatán Channel, but some interactions with both leatherbacks and

loggerheads around the Windward Passage (figures 81-82 and appendix F2b).[1334] Varying gear and fishing methods means that U.S. and Cuban fishermen may have different interaction rates with turtles. The U.S. data does substantiate that longline turtle interactions, with both leatherbacks and loggerheads, do occur off Cuba. This suggests that Cuban fishermen may also experience such interactions.

b. Eastern Atlantic

The authors have no details about Cuban longline interactions with turtles in the eastern Atlantic. It is not known what the level of interactions were or what the practice was when turtles are caught. Given the level of fishing effort and the potential of the FAC longline fleet, the number of turtle interactions could have been substantial. The principal Cuban researcher working on large pelagics for the CIP in the 1980s reports that turtle bycatches were not common. He also indicates that neither the FAC nor the CIP compiled data on turtle interactions.[1335] The authors note that such assessments have to be put in context. Without actual data is difficult to assess the level of interactions. The quantity of turtles taken presumably was small in comparison to the large quantities of fish being taken. Even small numbers of turtles, however, can mount up over a year, especially when Cuba was for many years deploying over 20 large longliners.

Cuban publications reviewed by the authors describing their commercial longline fishery make no mention of turtles. Almost certainly there would have been interactions with sea turtles. It is likely that all or at least some of the turtles were retained for meat, however, the authors have no direct confirmation of this. There is no indication that the Cubans had a program to discard hooked sea turtles.[1336]

As observer data is not available from other fleets operating in the area, it is difficult to assess just what the level of interactions experienced by the FAC fleet was. Available evidence suggest that the primary turtle that would be affected in the eastern Atlantic is loggerheads.[1337] This species has no commercial value except for the meat.

Cuba's eastern Atlantic fishery was significantly scaled back in the late 1980s and early 1990s and terminated in 1996-97 (appendix C7a). Thus, the Cubans no longer experience any turtle interactions in the eastern Atlantic.

F. Marine mammals

As search of data bases like ASFA which the authors have used to find papers on marine mammals off many other Caribbean islands does not show any papers concerning marine mammals off Cuba. There does not appear to be any Cuban publications addressing this subject. Interestingly, one available paper on Cuban manatees was done by a Puerto Rican researcher.[1338] The only reports the authors have noted in Cuban publications are public interest accounts of dolphins in Mexican aquariums.[1339] There have also been a few stranding reports.[1340] One report described the stranding of 14 pilot whales at a beach in Holguín Province during 1986. A 1978 report described a humpback stranding.[1341] Researchers participating in the joint United States-Mexico-Cuban shark assessment report that off Cuba they observed Atlantic spotted dolphins, pan-tropical spotted dolphins, and short-finned pilot whales.[1342]

U.S. researchers have conducted extensive research on the marine mammal populations along the U.S. coast. This work for the Gulf of Mexico and U.S. south Atlantic coasts provide some information on marine mammals along Cuba's northwestern coast.[1343]

The authors have been unable to find any published Cuban work or data on fishery interactions with marine mammals. CIP researchers report that hookings of marine mammals were extremely rare. There were, however, very extensive interactions with marine mammals, especially killer whales. Some other species were involved, but interactions with killer whales were the most prevalent. Killer whales would feed on the hooked fish before a set could be retrieved. One researcher described it as a "competition" between the fishermen and the killer whales. FAC longliners would generally leave an area once killer whales were observed. The whales on occasion would follow the longliners. There were occasional mortalities, primarily because the whales got entangled in the lines while feeding on the hooked fish. One Cuban researcher reports that fishermen have shown him the teeth from some of the killer whales that had got entangled in longline gear.[1344]

The Cuban Acuario Nacional (CAN) has collected dolphins in coastal waters. These dolphins are used for displays at various sites in Cuba. They are also used for commercial traveling displays. The traveling displays are apparently organized by a Mexican company--CONVIMAR.[1345] The authors observed one such display in Talcahauno, Chile during 1992.

The dolphin there was kept in very cramped conditions in rather dirty looking water. They are also traveling displays reported in Peru. In some cases dolphins have been abandoned when shows have failed. The Chilean Air Force in 1996 returned one such dolphin to Cuba in 1996. The CAN has also sold some of its captured dolphins after training them. One estimate suggests as many as 40 captured Cuban dolphins exist at scattered facilities in different countries.[1346] One of the countries importing these dolphins is Canada. One report indicates that Marineland of Canada imported eight dolphins from Cuba in 1986, all of which have died.[1347]

G. Seabirds

Several Cuban authors have addressed the topic of bird life on Cuba. As a result, considerable information exists on the abundance and diversity of birds on Cuba. The authors are unaware, however, of any study specifically addressing seabirds. Some overall studies of Caribbean seabirds, however, have provided some useful information. One study suggested that there is little seabird nesting in the mainland of Cuba itself, but some activity on offshore cays and islets, both along the northern and southern coast. Two species nest in the mainland, but 12 other species are believed to nest on offshore cays and islets (appendix F3).[1348] Some of the studies on the various cays, however, have information on sea birds.[1349] A 1996 report provided a census of seabirds at a coastal wetland, Las Ciénaga de Zapata, along the southeastern coast of Cuba. The census reported 33 species, most of which were wading birds unlikely to be involved in longline interactions. The most numerous species were flamingoes, but cormorants, spoonbills, stilts, and sandpipers were also reported.[1350] Another census detailed species found on cays located along the north-central coast, Paredón Grande and Coco, during the fall migration. Some of the most abundant species were warblers, and yellowthroats. Another report from a bird banding station provided information from a location along the northeastern coast.[1351] Various other reports provide data on bird populations at various wetland and beach areas along the coast.[1352] A report is also available from a biosphere reserve on the western coast of Cuba, Guanahacabibes. [1353] The Cubans are preparing an atlas of breeding birds.[1354] Researchers in 1998 preparing a shark assessment noted eight birds southwest of Cuba around Navassa Island (Haiti, appendix C3). The two species observed in the greatest numbers were Brown Boobys and Magnificent Frigatebirds.[1355]

Some research describes seabirds which feed on coastal fish. One soon to be publish study by Cuban and Spanish researchers addresses Cuban waders and terns.[1356] The most abundant bird colonies are along the central areas on both the northern (Atlantic) and southern (Caribbean) coasts which the authors believe are due to the larger populations of fish. The terns (*Sterna spp.*) in particular feed on pelagics, especially Clupeidae or "chicharro" (*Trachurus spp.*). The birds range up to 500 m from the coast. The sea bird populations off northwestern Cuba, where the artisanal longline fishery was centered, was reported to be "poor in sea birds".[1357]

The authors have been unable to find information on seabird interactions with fisheries.

Coastal fisheries: Cuban researchers confirm that they have not yet conducted research on seabird interactions with fisheries and potential bycatches.[1358] Fishermen targeting tuna in the live bait fishery report using seabirds to locate the schools of fish.[1359] The fisheries literature cited does not detail the types of birds involved. No information is available on possible seabird mortalities. Given the live-bait fishing method, significant adverse bird interactions are unlikely. The authors have been unable to obtain information on seabird interactions, either with commercial or artisanal longline fisheries. Seabirds are also known to be present during other fisheries, especially the trawl fishery as the birds feed on the discarded bycatch.[1360] No published study on the subject, however, is known to exist. One Cuban researcher reports that in his observations of the artisanal longliners that there were no seabird mortalities.[1361]

Distant-water fisheries: The authors have noted no mention of seabirds in the literature consulted concerning FCP and FAC distant-water fisheries. There does not appear to be any published studies on seabird interactions with these fisheries. One CIP researcher reports that interactions with seabirds were very rare, but no data was kept by FAC on seabird interactions.[1362]

XVI. International

A. International Relations

1. Multilateral

Cuba is active in several multilateral fora. The international fisheries organization in which Cuba has been most active has been ICCAT. The Cubans, however, withdrew from ICCAT in 1991 as there commercial tuna longline fishery began to wind down.

CARICOM: A CARICOM/Cuba Joint Commission meets annually to discuss trade, investment, and human resource units. Some limited increases in trade have been noted as a result of these meetings. Fisheries is a minor part of these conversations, but CARICOM has urged Cuba to participate in its regional programs and agencies, such as the Fisheries Management and Assessment Unit (CFRAMP).[1363]

ICCAT: Cuba was an active participant in ICCAT during the 1980s, but apparently had difficulty paying its ICCAT contribution.[1364] Cuba decided to withdraw from ICCAT, effective December 31, 1991. The Cuban decision was based on both the declining importance of its tuna and swordfish catches and increasing difficulty obtaining hard currency needed to participate in international organizations. Cuba continued, however, to collaborate with ICCAT programs.[1365] Cuba has not, however, provided fleet data to ICCAT since 1989 (appendix A1).

Non-aligned Group: Cuba has raised fishery issues at meetings of the Non-Aligned Group. A Non-Aligned meeting focusing on fisheries issues, the third such meeting, was held in Cuba during 1981. The meeting was attended by 44 countries.[1366] The authors know of no significant development flowing from these meetings. The group was most active during the Cold War. While the name suggests the countries were not aligned with either superpower, they often released resolutions that were decidedly favorable to the communists. The group's approach to fishery issues was more complicated. They could not easily criticize developed countries depredating the resources of developing countries because the Soviet Union was a major distant-water fishing country and even Cuba had a small distant-water fleet.

NAFO: Cuba is an active participant in the North Atlantic Fisheries Organization (NAFO). This organization primarily deals with demersal fisheries and is thus not pertinent to a discussion of Cuba's swordfish and other pelagic fisheries.

WECAFC: Cuba was an active participant in the FAO-sponsored Western Central Atlantic Fisheries Commission (WECAFC/COPACO). WECAFC has not, however, been very active in recent years.

2. Bilateral

a. Foreign fishing off Cuba

Distant-water fishermen do not conduct fisheries off Cuba, although there is some foreign activity in Cuban waters. Some of the most active foreign fishermen are U.S. longline fishermen who fish outside Cuba's 12-mile territorial waters, but within the 200-mile EEZ. Cuba unlike many Caribbean countries has a significant capability to patrol its waters and enforce the 200-mile zone. Actual patrols in recent years, however, have been limited because of fuel shortages and the high cost of fuel.

Data on foreign fishing is a available by ICCAT 5° squares. Given the size of Cuba and elongated geography, several different ICCAT squares include Cuban waters. Except for two ICCAT squares (2075 and 2080), most of the other areas fall largely in the EEZs of neighboring countries.[1367] The discussion here focuses primarily on ICCAT 5° squares 2075 and 2080. Some of the ICCAT squares off Cuba are covered in other chapters:

1570: Discussed in the Haitian chapter.
1575: Discussed in the Jamaican chapter.
1580: Discussed in the Cayman Islands chapter.
2070: Discussed in the Turks and Caicos chapter of this report.
2075: Discussed below.
2080: Discussed below.

Available information on distant-water and neighboring countries fishing off Cuba is as follows:

Cayman Islands: Cayman fishermen are not known to fish off Cuba. The Cayman Islanders did, however, play an important role in the Cuban turtle industry. Cayman Islanders immigrated to Cuba in the late 19th century and founded the Cocodrilo settlement which relied on turtles as their major economic activity.[1368]

Jamaica: Jamaican fishermen are not known to fish off Cuba. Jamaican fishermen deploy mostly small boats operating in coastal waters. The deepwater Cayman Trench runs between Cuba and Jamaica and there are thus no attractive fishing grounds located between the two countries.

Japan: While Japanese fishermen have at times been very active in the Caribbean, they report rarely working in Cuban waters. The Japanese typically report no swordfish and billfish fishing off Cuba.[1369] Some very limited fishing, however, in ICCAT squares 2075 and 2080 has occasionally been reported.

Japanese swordfish bycatches have never exceeded 1.6 t and were occasionally been much less (appendices C8g1-2). The last known Japanese fishing was reported in 1984. Cuban sources report Japanese operations for bluefin in the 1980s.

Korea: The authors know of no Korean fishing off Cuba (appendices C8g1-2).

Mexico: Mexico has a small longline fleet operating out of Yucalpeten. The fleet operates in the Gulf of Mexico and the Caribbean south of Cuba targeting primarily yellowfin and bigeye tuna with a small swordfish bycatch.[1370] While a 1976 bilateral agreement allows Cuban fishermen to fish off the Yucatán Peninsula, there is no reciprocal access for Mexican fishermen. The agreement is highly unpopular with Mexican fishermen.[1371] The authors do not know of any incidents involving Mexican fishermen operating off Cuba. The Mexican Government has maintained the relationship as part of Mexico's foreign policy of cultivating friendly relations with Cuba. Fishery officials meet annually with Cuba to plan exchanges and decide on an annual grouper quota. Even though there is no reciprocal access for Mexican fishermen, it is likely, however, that Cuban enforcement patrols would treat Mexican fishermen rather flexibly.

Spain: Spanish fishermen report no swordfish fishing off Cuba (appendices C8g1-2).[1372]

Puerto Rico: A few Puerto Rican vessels are deployed on distant grounds for demersal species. Some of these vessels have been noted on Bahamian, but not Cuban grounds.[1373] While some vessels may have small longlines, there is little or no swordfish taken.

Taiwan: Taiwan reports no fishing off Cuba (appendices C8g1-2). A large number of Taiwan-owned longliners, however, are operated under flags-of-convenience registrations. The authors during the 1980s have noted some Taiwan longlining in Cuban waters. At least some of it has been conducted with the knowledge of Cuban authorities.The U.S. Coast Guard reports seeing Taiwan-owned longliners (the Boada series) moving in an out of Havana harbor during 1999-2000. Some of the vessels are known to have set lines, including at least one set right outside Havana Harbor. These vessels appear to have Panamanian or Philippine registration.[1374] The authors know, however, of no licenses issued to Taiwan vessels. The most likely explanation is that the Taiwan fishermen have contracted work in Cuban shipyards and that the Taiwan longline fishermen are allowed to make sets as they move into and out of Cuban waters.

Photo 58.--This Filipino fishermen recovered a tag from the bluefin tuna. He reports that he was working on the Taiwan-owned "Boada 5" and the tuna was caught in a set right off Havana harbor.

United States: The United States began developing a longline fleet targeting yellowfin tuna in the Gulf of Mexico. U.S. longline fishermen began targeting swordfish in the mid-1980s after commercial stocks were encountered off the Florida Atlantic coast.[1375] U.S. longline fishermen fish extensively near Cuban waters. Much of the activity is within the U.S. EEZ to the West and East of Florida. There is also some activity around the Yucatán Channel off western Cuba and the Windward Passage off eastern Cuba. While fishing intensity (probably a reflection of catch rates) are highest in the U.S. waters of the northern Gulf of Mexico, swordfish are taken throughout the Gulf.[1376] United States-Cuban relations improved briefly during the late 1970s. Cuba was granted small allocations to trawl off the U.S. northeastern coast. Two U.S. fishermen in 1979 requested reciprocal rights to longline off Cuba. Both experienced long delays with their applications. Cuban officials explained that they were preparing needed fishing

regulations.[1377] Neither ever received the necessary permits. It is unclear if the Cuban Government rejected the applications or just failed to act upon them. No official bilateral fishery contacts on fisheries have occurred during the 1980s and 90s. The U.S. fleet, however, continues to fish extensively in U.S. waters off Florida immediately north of Cuba. Large numbers of juveniles are often taken in this area and NMFS is implementing closures. U.S. longline fishermen have been active off Cuba near both the Windward Passage and the Yucatán Straits and along the northwest Cuban coast (figure 7). U.S. fishermen rarely report fishing south of Cuba. The U.S. fishing is highly seasonal, primarily conducted during the winter and early spring. Cuban authorities have not prevented the U.S. longliners from making sets in their EEZ as long as they stay outside of the 12-mile territorial waters.[1378] U.S. fishermen stay outside of Mexican and Bahamian waters because the U.S. Coast Guard will seize U.S. fishermen operating there without a license and prosecute the fishermen for Lacey Act violations. One fishermen told the authors, "Hell, its not Cuban gunboats I worry about, its our own Coast Guard."[1379] The Cubans have also been allowing the U.S. longline fishermen to move into protected coastal waters during inclement weather. "Packs" of U.S. longliners anchored together may be approached by Cuban gunboats. The fishermen report that steaks, chicken, and fuel are exchanged and that the Cubans are professional during these encounters.

USSR: The Soviet Union never actively fished off Cuba, but the Soviets did try to initiate a fishery in the nearby Gulf of Mexico, especially on the Campeche Bank off Mexico, during the 1960s. The Cuban-Soviet Joint Commission on Marine Fishing was very helpful in supporting this effort.[1380] The Soviets used Havana as a support base. Some catches were reported in the early 1960s, but the fishery was largely discontinued by the end of the decade.[1381]

b. Cuban distant-water operations

Cuba conducted extensive distant-water fisheries during the 1970s and 1980s. The most extensive distant-water operation was conducted by the Cuban Flota Cuban de Pesca (FCP) which deployed large stern factory trawlers in the northwest Atlantic, southeast and southwest Atlantic and southeast Pacific. This activity has virtually ceased because Cuba can not afford to finance the enormously expensive fuel costs required for distant-water operations after the Soviets reduced and the Russians terminated the petroleum subsidy. This subsidy had for years been a key element in the foreign assistance provided the Cubans.[1382]

While the Cubans have scaled back their distant-water fishery, it has not been discontinued entirely. Operations continue off Canada (appendix C1a2b). Reports, as recent as 1995 suggest that Cuban officials continue seeking possible access to important demersal grounds, such as off Namibia. Press reports indicate that Cuban companies like AGECREW are currently contracting Cuban crews to serve on foreign vessels. Other companies are arranging package deals with Cuba providing vessels and crews. These arrangements all appear to involve trawlers. The only known contract negotiated for a longliner has been a short-lived contract negotiated with the Bermuda company, Seamont Fisheries.

Detailed information is not available on Cuba international fishery relations. They were especially active off Africa, although specifics on the actual nature of their various fishery agreements are often lacking. Cuba pursues relations with a number of African countries as part of its overall foreign policy. In recent years, aquaculture has been a topic discussed in bilateral meetings with several countries.

Angola: Cuba has held high-level fishery discussions with Angola. Cuban Fisheries Minister Anibal Velaz Suárez, for example, visited Angola in 1978.[1383] Cuba negotiated a bilateral fisheries agreement with Angola in the 1970s. The text of the agreement was never published and is considered a state secret.[1384] One observer reports that Cuba appears to have made little effort to assist Angola to develop its fishing industry and appears to have been primarily interested in obtaining access to its coastal fishing grounds.[1385] The Cubans deployed a fleet of shrimp trawlers off Angola in the 1970s.[1386] The Cubans also reportedly deployed several stern factory trawlers in the fishery for groundfish off Angola, but probably devoted most of their effort in the southeastern Atlantic to the waters off Namibia (appendix C1a2a). Angola and Cuba regularly discussed fisheries at the annual economic cooperation meetings. Little information is, however, available on the results.[1387] A fisheries agreement was signed in 1997, but the new releases mentioned research and training and not access arrangements.[1388] The authors note that Cuba reported catches in the southwestern Atlantic during 1999 (appendix C1a2b2). It is not clear if they are fishing off Angola, Namibia, or elsewhere.

Argentina: Cuba has deployed trawlers off Argentina, but the authors know of no longliners deployed there. Cuba began fishing on the Patagonian Bank off Argentina in 1966, following the lead of the Soviet fishing fleet.[1389] The effort was limited, reaching only 2,000 t in 1968 when the Cubans terminated the fishery because the Argentines declared a 200-mile zone and initiated strict enforcement patrols. A variety

of trade discussions involving vessel purchases and trade in fishery commodities were conducted by Argentine and Cuban officials during the 1970s, but few details exist on actual commercial exchanges and relations were constrained by the political differences between the two governments.[1390] Cuban-Argentine relations improved during the 1980s, in part because of Cuba's strong support for the Argentine position on the Falklands.[1391] Cuba initialed a technical cooperation agreement on fisheries with Argentina in 1984. The agreement raised the possibility of an Argentine fisheries allocation, but it appears the agreement was never ratified. The Cubans conducted some exploratory fishing in the southeastern Atlantic during 1984, outside the Argentine 200-mile zone. They then resumed limited fishing operations in 1985. Catches peaked at 7,200 t in 1987 (appendix E). The Cuban catches were almost totally composed of *Illex* squid taken on the high seas. Continued Cuban fishing off Argentina is confirmed by press reports which indicated that the Cuban trawler *Río Saza* sank in 1989 after colliding with a Taiwan vessel off southern Argentina outside the 200-mile limit.[1392] The Cubans reduced their fishing effort off Argentina in 1990 and terminated the fishery in 1991. Argentina adopted a new foreign fishing system in 1992, opening Argentine waters to foreign fishing. This was of little benefit to Cuba which was at the time reeling from the end of the Soviet oil subsidy and idling their fleet. The primary goal of the argentines appears to be increasing income from the leasing fees and the acquisition of modern fisheries technology. Cash strapped Cuba in the early 1990s was not in a position to pay high fees for access rights. The authors note that Cuba reported catches in the southeastern Atlantic during 1999 (appendix C1a2b2). It is not clear if they are fishing off Argentina, Uruguay or elsewhere, but the authors note that the Coral-Suzki joint-venture is incorporated in Montevideo and has an affiliate in Buenos Aires.

Belize: Cuba and Belize signed their first-ever agricultural agreement on October 1, 1999. Belize like Cuba has an important lobster fishery. The 1999 agreement included a variety of fishery provisions. Cuba agreed to provide technical assistance on capture fisheries (shrimp, lobster, and finfish) and aquaculture. The Cubans also offered to train Belizians at their extensive system of fishery schools. Longlining was not mentioned as part of the exchanges.[1393]

Bermuda: Cuba did not deploy its longliners off Bermuda, except during 1998-99 when FAC operated the *Jurel* under a contract with a Bermuda company. (See "XVI. B. Joint venture" below.)

Brazil: Press reports in 1999 indicated that talks had been held between the Cuban Deputy Fisheries Minister and Brazilian fishery officials on possible fisheries cooperation.[1394] No information is available on the nature of the cooperative projects under consideration.

Canada: Canada has routinely provided a small groundfish allocation to Cuban trawlers. No Cuban longliners are deployed off Canada, only trawlers. The Cubans have fished intermittently off Canada since 1966, and regularly since 1976. Canada seized three Cuban fishing vessels in 1976 for violating its 12-mile territorial limit, which at that time was also the extent of its fisheries jurisdiction.[1395] Canadian authorities in January 1977 extended its jurisdiction to 200 miles. Cuba signed a fisheries agreement with Canada on March 12, 1977, governing Cuban fishing in Canada's fisheries zone.[1396] The Canadians agreed to provide a catch quota to the Cubans from the expected Canadian surplus of various fish species. The quota is set at annual consultative meetings. The Cubans had hoped to combine the Canadian allocation with a compatible allocation in U.S. waters. Cuba received a smaller U.S. allocation than expected, so Cuban officials assigned fewer vessels to the northwestern Atlantic than they had originally anticipated. Since 1980, the Cuban fishery off North America has been entirely off Canada. The Cubans and Canadians meet annually to discuss the fishery allocations, trade and other fishery cooperation issues.[1397] The Cubans were consistently granted Canadian catch quotas larger than they were able to utilize, until 1986, when they took their entire quota. The annual quotas for 1984-88, mostly silver hake, were set at 23,000 tons. Despite increasing problems with stocks and sharp allocation cuts to domestic fishermen, the Canadians have continued to provide allocations to the Cubans. Presumably the allocations are part of Canada's overall diplomatic effort to maintain positive relations with the Cuban

Photo 59.--The "Jurel" was one of 16 Alecrín-class longliners that Cuba deployed in the eastern and central Atlantic. Royal Gazette (Bermuda)

Government. The Cubans have continued their fishery off Canada and since 1984 have reported catches of 15,000-30,000 t in most years through 1997. The Canadians appear to be pursuing a notably different policy with Cuba than with other distant-water countries. The Canadian Government, despite increasing opposition to foreign fishermen by the hard-pressed domestic fishing industry, has continued Cuban allocations and FCP has continued working off Canada (appendix C1a2a and C1a2b1). Cuba caught 30,000 t in 1993, only slightly less than the record 32,000 t reported in 1991. Catches by 1998, however, had fallen to less than 8,000 tons and only 4,000 t in 1999 (appendix C1a2b2). This fishery has been important for the Cubans because it had allowed them to catch hake, redfish, and squid, much more desirable species than the low-value jack mackerel taken in other distant-water fishing grounds off Chile and Peru. Most of the 1998 Cuban catch off Canada, for example, was silver hake. Cuban officials, for that reason, has been willing to allocate FCP fuel to operate trawlers off Canada despite the island's severe fuel shortage.[1398] The Canadians in 1999 even allowed the Cubans to launch a new fishery for shrimp.[1399] While the Canadian policy toward Cuba is partially based on Canada's overall foreign policy of maintaining economic ties with the Cuban Government, the Canadians have also insisted that in return for their catch allocation, the Cubans purchase Canadian fishery products.[1400] These purchases are one of the key factors in determining the actual allocation. Cuba purchases processed fish from Nova Scotia and Prince Edward Island; the salted fish (bacalao) produced there is a popular consumer product in Cuba and other Latin American countries. Cuba has made annual commitments to purchase US$2 million of Canadian processed fish.[1401] Canadian Fisheries and Oceans Minister, John Fraser, noted in 1985 that "Canada has maintained a stable level of catch allocations to Cuba in recognition of Cuba's contribution to Canada's fish marketing efforts, and Cuba's cooperation on conservation." The authors, however, have no current data on Cuban fish purchases.[1402] The future of Cuba's northwestern Atlantic fishery off Canada would seem unclear. The Canadian Government has had to sharply cut allocations to its own fishermen. Thousands of fishermen and processing workers have been laid off.[1403] Plants and vessels are idled. The Canadian Government would seemingly find it increasingly difficult to justify the continued allocation to Cuba, no matter how small. Despite the domestic difficulties, the Canadians have continued providing allocations to the Cubans throughout the 1990s.

Cape Verde: Cuban and Cape Verde officials signed a fisheries cooperation agreement in Havana during December 1998. The agreement primarily concerns aquaculture and the formation of joint fishery associations.[1404]

Chile: The Soviets and the Cubans initiated bilateral fishery cooperations with the Chileans during the early 1970s. The Chilean military Government immediately broke all diplomatic relations with Cuba in 1973 after seizing power from President Allende. The fisheries cooperation program conducted during the Allende period was terminated. The Cubans quickly negotiated a joint fisheries venture with neighboring Peru and also began to fish outside Chile's 200-mile zone.[1405] The election of a democratic Chilean Government has meant renewed relations with Cuba. The Cubans, however, withdrew their fleet from the southeastern Pacific in 1993 (appendix C1a2b). Cuba never operated longliners in the Pacific. Cuba has, however, begun importing Chilean canned fish.[1406] The imports appear to have begun in 1998 and totaled over $19 million in 1999.[1407]

China: A delegation from the China National Fisheries Corporation (CNFC) visited Cuba in September 1998 to assess possible commercial exchanges. They met with representatives of PESPORT and Terref. The Chinese were reportedly interested in hake. Some of Cuba's distant-water trawlers have been deployed for hake. The Cubans were interested in building purse seiners in Chinese shipyards and forming a joint venture with CNFC.[1408] The authors know of no Chinese fishing in the Caribbean, but in 1990 China has initiated a small longline fishery in the Atlantic. Chinese catches from 1993-97 have ranged from 281 t (1993) to 879 t (1995), mostly bigeye tuna. China reports that four longliners were active in 1997 and caught 617 t, of which 30 t was swordfish. The 1996 catch of swordfish was much higher, totaling 100 tons.[1409] The Chinese catch appears relatively small for four longliners. ICCAT reports that they are in the 201-500 GRT size range.[1410] No information is available on where the Chinese operate.[1411] The authors know of no cooperation between the Cubans and Chinese with longline operations.

Guyana: Guyana and Cuba have cooperated on a trawling venture, but we know of no cooperation with longlining. Guyana in 1972 was one of the first Latin American countries to re-establish full diplomatic relations with the Castro government. Guyana, like most other Latin American countries, had broken relations with Cuba during the 1960s. A seven-member Cuban delegation, including four fishery experts, visited Georgetown for fishery talks in August 1973 and signed an agreement permitting Cuban fishermen to catch shrimp in Guyanese waters and allowing them access to Guyana's ports. In return, Cuba agreed to donate 10 percent of the shrimp caught off Guyana (estimated at about 2,000 t per year) to the

Guyanese Government, and to provide fisheries technical assistance. The agreement went into effect on January 1, 1974. A Guyanese delegation visited Havana in 1974 to discuss details on technical cooperation. Guyanese Minister of Economic Development, Kenneth F. S. King, met with the Director of the Cuban Instituto Nacional de Pesca, Anibal Velez, and the two parties reached agreement on a scientific and technical cooperation program on May 14, 1974. This agreement provided for the assignment of Cuban coastal technical personnel to establish a research program and train Guyanese fishermen. Cuba expanded its second fishery off South America from its new base in Georgetown. Unlike the fishery off Chile and Peru, the fishery on the Guianas Bank for shrimp and related species was similar to already-established Cuban fisheries. More than 100 Cuban administrative and technical personnel were working in Georgetown by 1976, and some 10-16 Cuban trawlers, operated by more than 100 Cuban fishermen, were fishing and shrimping off Guyana. One report indicated that much larger numbers of trawlers, as many as 70, may have been deployed off Guyana.[1412] Cuba marketed the shrimp catch, apart from the Guyanese Government's 10 percent, largely in Canada. Unconfirmed reports suggest that substantial portions of the Cuban catch were mislabeled and re-exported to the United States through the same Canadian marketing channels in violation of the U.S. ban on imports of Cuban-origin product. No information is available on the results of the training and technical assistance provided to Guyana by the Cubans. The Cuban fleet ceased operations off Guyana, apparently in 1981. The reasons are not completely clear. The Cuban Deputy Minister for Fisheries, Hector Parras Lopez, claimed that the Cuban Government found the operations to be "uneconomical." However, other sources suggest political motivations. Press reports indicated that Guyanese Prime Minister Forbes Burnham was dissatisfied with both Soviet and Cuban aid, and believed that Cuba had been "cheating" on their contract. Several newspapers carried articles describing a growing political strain between the two governments. A number of Guyanese studied in Cuban fishery schools and some worked with Cuban researchers in the CIP. At least two are known to have graduated as marine fishery biologists from Havana University. One is T. Phillips who works with the Turks and Caicos fisheries.

Haiti: Haiti and Cuba signed a maritime boundary accord in Havana on October 27, 1977. The accord delimited the maritime boundaries between the two countries using 51 geodetic coordinates based on the principle of equidistance.[1413] Four Cuban fishing boats carrying 37 technicians arrived in Port-au-Prince during early 2000. The Cubans joined others already in Haiti and plan to stay for about a year. The Cubans were participating in the Haitian Government's fisheries development program. The Cubans are involved in both capture fisheries and aquaculture and are reportedly contemplating the construction of 100 small fishing boats for the Haitian Government.[1414]

Mauritania: Cuban officials discussed access arrangements with Mauritanian officials to trawling grounds in 1995. The Mauritanians were apparently willing to provide access, but Cuba had difficulty obtaining needed fuel. Press reports in 1999 indicated that 10 stern trawlers reconverted in Spanish shipyards were being deployed off Mauritania and other West African countries.[1415] Like all the Cuban distant-water ventures in recent years, they have involved trawlers rather than longliners.

Mexico: Cuba in the 1960s began fishing extensively in the Gulf of Mexico, especially in the southern Gulf on Mexico's Campeche Banks. Cuba signed a bilateral fisheries agreement with Mexico in 1976 following Mexico's declaration of a 200-mile EEZ. Under the agreement, Mexico permitted Cuba to catch small quantities of grouper off the Yucatán Peninsula.[1416] The authors know of no cooperation on longlining between Cuban and Mexican fishermen. Cuba and Mexico meet annually to discuss fishery issues. The Mexicans provide the Cubans a small finfish allocation, mostly grouper, in the Gulf of Mexico. The allocation for the Cubans in 1989 was set at 4,000 tons. The authors know of no reciprocal allocation for the Mexicans off Cuba. They also conduct a variety of technical exchanges on issues identified as priority matters.[1417] These have included aquaculture, lobster fishing, and other topics. The authors know of no exchanges on longlining or most highly migratory species, like tunas and swordfish. There has been some joint work on sharks.[1418] The access arrangements are not popular with Mexican fishermen. Articles regularly appear in Mexican newspapers with complaints by the fishermen.[1419] Mexico has, however, continued for 25 years to provide Cuba an allocation as part of its overall foreign policy. Mexico's Fisheries Director, Carlos Camacho Gaos, indicates that the Cubans "maintain strict discipline".[1420] Officials continue to meet annually to discuss an allocation for Cuba and fishery cooperation activities.

Namibia: The Cuban distant-water fleet initiated fishing operations in the southeastern Atlantic, primarily off Namibia during 1969. The fishery has since been one of FCP's primary distant-water grounds, although catches peaked in 1978 at 64,000 tons. FCP sharply reduced effort from 1980-82 for unknown reasons. FCP resumed significant operations in 1983 and catches during the remainder of the 1980s

were relatively stable, ranging from 25,000-38,000 t during 1985-89 (appendix C1a2a). FCP curtailed operations in 1990, catching only 12,000 t (appendix C1a2b). Cuban officials estimate that they caught up to $290 million worth of fish while Southwest Africa was administered by South Africa. Press reports indicate the Namibians have decided to give priority to the development of their fishing industry and regard fisheries as a key national resource. The Cubans terminated the fishery in 1991 after Namibia's newly-independent Government declared a 200-mile zone and prohibited foreign fishing. Since independence in 1990, the Cubans have tried to reenter the fishery. The Cuban Government, like other distant-water countries, approached Namibian officials concerning access to Namibian waters.[1421] Namibian sources report that at high-level meetings held in Cuba during 1995, Cuban officials strongly suggesting that the Namibians owed a debt to Cuba for the assistance provided during their independence struggle. The Namibians reportedly rejected the Cuban request insisting that other countries also aided in the independence struggle and the Governments first duty was to the Namibian people.[1422] Such access would have primarily been for trawlers as the authors know of no Cuban longlining as far south as Namibia. Presidents Castro and Nujoma signed an agreement establishing a joint cooperation agreement in March 1991. Press reports indicate the agreement includes provisions for fisheries cooperation.[1423] The authors believe, however, that the agreement did not include fishery allocations. The authors note that Cuba reported catches in the southwestern Atlantic during 1999 (appendix C1a2b2). It is not clear if they are fishing off Angola, Namibia, or elsewhere.

Peru: One of Cuba's principal fishing grounds was the western coast of South America off Peru and Chile. In some years, the Cuban fishery off Peru and Chile, accounted for nearly half the overall Cuban catch. The Cubans in 1986 caught nearly 90,000 t of fish (appendix C1a2a). Most of the catch was jack mackerel, but in some years the Cubans were allowed to catch small quantities of hake. FCP had to terminate their fishery off Peru in 1992. FCP was unable to deploy vessels in this fishery during 1993 because of fuel shortages.[1424] All the Cuban vessels deployed off Peru were FCP trawlers. FAC longliners were not deployed in the Pacific. Press reports in 1997 indicated that the Cubans were considering the renewal of operations for jack mackerel in international waters off Peru in the eastern Pacific.[1425] Cuba reported catches in the eastern Pacific of 4,200 t in 1999 (appendix C1a2b2).

Russia (1992 to date): There are currently no Russian fishing operations in the Caribbean. Russian tuna operations in 1997 consisted entirely of purse seine fishing, conducted with seven mid-sized seiners operating off Sierra Leone and in the central tropical Atlantic.[1426] Reports in the early 1990s suggested that Russia was continuing to maintain some cooperative ties with MIP, but was no longer administering an important foreign assistance program. The Russian Ministry of Fisheries in the early 1990s continued to maintain a fisheries attache office in Havana.[1427] By 2000, however, the Russians no longer maintained a fisheries attache at the Embassy. The authors know of no continuing fishery cooperation between the Cuban and Russian fleets, although little information is

Photo 60.--The FAC relied heavily on the Soviet fishing fleet for support, especially fuel. Here a Soviet tanker is refueling a FAC longliner in the central Atlantic.

available on this subject. Cuban sources report that the last Russian trawler called in Havana during 1993. President Putin visited Cuba in December 2000 and was warmly received by President Castro. Putin was the first Russian leader to visit Cuba since Soviet Premier Gorbachev's April 1989 visit in which he informed Castro that assistance levels would have to be curtailed. There are undoubtedly a variety of issues which prompted Putin's visit.[1428], but the one discussed most prominently in the Soviet press was Russia's interest in participating in the opening of the Cuban economy. President Putin reportedly believes that Russian companies are losing out to European companies, despite the Soviet Union's enormous investment in Cuba. Russian officials are also hopeful that Cuba might eventually repay some of the estimated $20 billion dollar debt owed the former Soviet Union.[1429]

USSR (1959-1991): The Cubans developed very close ties with the Soviet Union. The Soviets had a major role in the early development of the Cuban fishing industry and fisheries research establishment.[1430] (See "Research" above and "Foreign Aid" below.) One of the principal Soviet projects was to build a modern fishing port in Havana. The port was paid for by support and maintenance services offered to the Soviet distant-water fishing vessels. One 1982 report indicated that since the mid-1960s, more than 800 Soviet fishing vessels had been serviced at the Havana fishing port.[1431] The most valuable support provided by the Soviets was access to subsidized diesel fuel. Some of this fuel was provided directly to Cuban longliners and trawlers on the high seas by Soviet tankers. The Cubans would have otherwise had difficultly financing fuel purchases at market prices for their distant-water fleet. The Soviets began reducing the fuel subsidy in the late 1980s and it was terminated in 1992 after the dissolution of the Soviet Union. The Soviets also played a major role in developing the Cuban distant-water trawl fishery, although the real long-term benefits to Cuba were limited and may have actually been negative given the large deficits these operations ran.[1432] The Soviets played a relatively small role in the development of the Cuban longline fleet as mostly Japanese and Spanish technology and vessels were used. The Soviets were interested in developing a longline fishery themselves and did conduct research cruises to collect information. Some of these cruises were conducted cooperatively with the Cubans.[1433] In addition, the FAC was able to utilize Soviet fleet support vessels to obtain fuel and supplies on distant-water fishing grounds. The availability of these services off West Africa may have been a factor in the Cuban decision to focus their fishery in the eastern Atlantic off West Africa. The Soviets launched a longline fishery of their own, but it has not proven very successful.

B. Joint ventures and commercial contacts

The Cuban Government nationalized most foreign assets in Cuba during the first years of the Revolution. As a result, foreign investors understandably avoided Cuba for the next three decades. President Castro viewed the nationalization of foreign holdings as a major accomplishment of the Revolution. Only in the 1980s did Cuban officials begin to rethink their attitude toward foreign investment. The Government issued Decree Law No. 50 in 1982 to regulate joint ventures. The restrictive conditions in the law, however, did little to attract foreign interest. The loss of Soviet assistance in the 1990s forced the Cubans to completely revise their attitude toward foreign investment.

The same Cuban Government which once assailed foreign investment as evil and exploitative, now proudly reports on its success in attracting foreign investors back to Cuba. The Government issued Law No. 88 in 1995 that offered more favorable conditions to the foreign investor.[1434] Subsequent laws and amendments now allow for 100 percent foreign ownership and repatriation of profits. Major investments have been made. Most of these investments have been in the tourist industry and involve service or management agreements rather than equity investment in market terms.[1435]

Foreign companies have made few investments in Cuba's fishing industry. An assessment by Cuban and American academics, however, identified fisheries as one of the five sectors that would be likely areas for foreign investment.[1436] Cuban officials are especially interested in attracting investments in aquaculture (hatcheries for shrimp and finfish--both freshwater and marine species), small fiberglass boat construction, and distant-water fisheries (chartering Cuban crews and or vessels to foreign companies).[1437] Cuban officials have placed fishing vessels on a list of potential investment opportunities/joint ventures distributed to foreign investors. The Cubans have reportedly offered Tasca-95 factory vessels, built in Spain during the 1970s, for lease with a purchase option, or for a joint venture.[1438] Available details on such ventures are discussed under the individual country heading below.

The authors have little information indicating that Cuba has negotiated joint venture fishery agreements with foreign companies for operations in Cuba. Scattered press reports have indicated, however, that the Cubans have negotiate some joint venture agreements for their distant-water fisheries. The

Photo 61.--This Cuban longliner was contracted by the Bermuda company Seamont. The Cuban captain, however, kept landing large quantities of unwanted shark. Neil Inchcup

authors have noted the following reports on joint ventures or commercial activities with foreign countries.

Argentina: Argentine press reports suggested in 1983 that Cuba was close to finalizing a joint venture permitting four Cuban trawlers to operate in Argentine waters.[1439] This venture does not appear to have materialized.

Bermuda: A Bermuda businessman in 1998 contracted with the Flota Atunera Cubana (FAC)[1440] to operate the commercial longliner *Jurel,* complete with a 26-man Cuban crew, off Bermuda. The Bermuda Government granted a provisional fishing license.[1441] Unlike some other foreign vessels licensed by Bermuda, the Cuban longliner landed its catch in Bermuda for sale on the St. George's market.[1442] The catch included albacore, yellowfin, swordfish, billfish, shark, and other species. In terms of the local market, substantial quantities of fish were landed. The first landings were in November 1998 and included nearly 1 t of swordfish. Unfortunately, the captain also landed nearly 18 t of shark which the Bermuda company contracting the vessel could not market (Bermuda, appendix B6b). The Bermuda Government in 1999 allowed the Cuban vessel to fish within Bermuda's 200-mile EEZ as well as on the highseas.[1443] The Bermudian businessmen declined to renew the lease in 2000 because of high operating costs, especially the cost of servicing and maintaining an old vessel that was in poor repair, and the insistence of the captain on landing large quantities of shark that the Bermuda company did not want and could not sell.[1444]

British Virgin Islands: The Cuban Chamber of Commerce in 2000 identified Pescatlan as a joint venture with a BVI company.[1445] The authors, however, have no details about this venture.

Bulgaria: Bulgaria was one of the countries participating with Cuba in the Soviet-led Six Party Mixed Commission for Fisheries Cooperation.[1446] Bulgaria was once an important trading partner, but current economic relations are believed to be minimal.

Canada: The Cuban Ministry of the Fishing Industry (MIP) operates a Canadian-registered company, CARIBEX, to market Cuban seafood in Canada. The company in the past has been involved in operations shipping Cuban seafood to the United States by disguising its origin.

China: The authors know of no cooperation with China on highseas fisheries. The Chinese longline fleet is still quite small in comparison to the Taiwan fleet. China is, however, developing increasing expertise because many mainland Chinese have worked on Taiwan longliners. The Cubans and Chinese have discussed fisheries cooperation. The Cubans are interested in building purse seiners in Chinese shipyards, but lack the financing. They are also considering joint ventures with Chinese companies, PESPORT and the China National Fisheries Corporation.[1447]

Chile: Chilean canned fish began appearing in Cuba stores during 1998. The authors do not know what companies are involved.

Germany (East): East Germany was one of the countries participating with Cuba in the Soviet-led Six

Party Mixed Commission for Fisheries Cooperation.[1448] East Germany was once an important trading partner, but current economic relations are believed to be minimal.

Norway: Cuban Deputy Fisheries Minister Enrique Oltuski visited Norway during March 1998. He was primarily interested in acquiring aquaculture technology and in attracting Norwegians investors.[1449]

Panama: MIP has various commercial relations with Panamanian companies. In the past, some of these companies have imported Cuban seafood and then re-exported it to the United States as Panamanian product. Few details, however, are available on these operations. The authors noted substantial Panamanian lobster exports to the United States during the early 1990s. The quantities shipped exceeded the catch of Panamanian fishermen (appendix E5). Panamanian Government officials report, however, that the apparent discrepancy is not Cuban lobster, but rather Russian lobster transshipped through Panama.[1450] Notably Panamanian lobster exports in 1993 dropped sharply returning to levels more consistent with actual catches (appendix F4). Other Cuban seafood may have also been involved, but probably not tuna and swordfish.

Peru: Cuba formed several joint ventures in Peru beginning in 1973. A long complicated relationship followed, including two of the Cuban vessels, the *Río Jobabo* and the *Rio Damuji* being sunk in Callao harbor. President Castro accused the Peruvian Navy of sinking the vessels.[1451] As the Cuban fishery was conducted by FCP factory trawlers, it is not addressed in detail by this report.[1452] The Peruvian Foreign Minister visited Cuba in February 1999 to sign several bilateral agreements, including one on fisheries research.[1453]

Poland: Poland was one of the countries participating with Cuba in the Soviet-led Six Party Mixed Commission for Fisheries Cooperation.[1454] Poland was once an important trading partner, but current economic relations are believed to be minimal.

Romania: Romania also participated with Cuba in the Soviet-led Six Party Mixed Commission for Fisheries Cooperation.[1455] Romania was once an important trading partner, but current economic relations are believed to be minimal.

Spain: Spain is one of the principal countries investing in Cuba. Investments have primarily been directed at the tourist industry.[1456] There have, however, been some fishing ventures. The Cuban-Spanish joint venture Pesca Brava marketed Cuban seafood in Spain. There have been joint Cuban-Spanish ventures involving fishing off Africa. A Cuban trawler, the *Rio Contramaestra*, rammed and sank the Spanish trawler *Monte Furado* off Namibia on October 18, 1984.[1457] The two vessels are believed to have been involved in joint fishing operations. The authors have few details about Spanish fishery investments in Cuba. One company, Coral Suki registered in Spain and Uruguay, was active during the 1990s in contracting Cuban trawlers and fishing boats. See "Uruguay" below for details.

Taiwan: There are indications that there may be some cooperation or commercial activity between Cuba and Taiwan. Two Taiwan longliners, the *Boada 7* and *Boada 9* were spotted off Cuba in or near the 12-mile territorial sea during 1999. The *Boada 7* was underway while the *Boada 9* was stopped. When approached by a U.S. Coast Guard cutter they ran up the Cuban flag in the presence of a Cuban patrol boat.[1458] So the Taiwan vessels were apparently present off Cuba with the tacit approval of Cuban authorities. It seems unlikely that the Cubans would allow commercial Taiwan longliners to work coastal Cuban waters, but this appears to be occurring. The Panamanian-flag longliner *Boada 5* owned by a Taiwan company is known to have set longlines right off Havana harbor as well as other sets in Cuban waters.[1459] This would not have been possible without the knowledge and consent of the Cubans. The authors at this time have no further information on the nature of the relationship between Taiwan fishing companies and the Cubans. The vessel was not operating exclusively off Cuba, as the *Boada 5* was involved in a 6-month trip taking it as far north as the Faeroe Islands.[1460] It is unlikely that the Cubans would permit Cuban longlining in their waters without some quid pro quo. The authors have, however, no reports of Cuban fisheries cooperation with Taiwan. Taiwan officials report that there are no official contacts with the Cuban Government and that they know of no commercial relations with Cuba.[1461] Perhaps the Taiwan fishermen were using Cuban ports or shipyards. The Cubans have a substantial vessel repair and maintenance capability that is known to be interested in attracting foreign vessels to earn hard currency. The authors, however, have no information to confirm this. Interestingly, Mainland Chinese fishing company executives visited Cuban shipyards in 1998.[1462]

United Kingdom: Executives of the large British seafood company J. Marr visited Cuba in April 1998. The British were attempting to source new supplies of pelagic fish.[1463]

United States: Cuba negotiated a Governing International Fisheries Agreement (GIFA) with the United States during the 1970s to gain access to U.S. grounds. Since the 1980s, however, there have been no bilateral fishery activities, only some limited research contacts.

Uruguay: AGECREW announced signing a contract in 1999 for Cuban crews to work aboard Coral Suki trawlers off Africa.[1464] The Coral Suki company is

registered in Uruguay and Spain. The company began operations in 1994. It has operated Ukrainian trawlers off Africa under an agreement with the Moroccan Government. Coral Suki supplies the vessels and arranges for coastal access and crew exchanges. The Ukrainian trawlers are used in mid-water operations.[1465] The Cubans have reportedly initiated trawl operations off Mauritania and other West Africa countries with reconverted trawlers in 1999.[1466] The authors are unsure just who the Cubans are working with, but believe there may be a joint venture partner.

USSR: Cuba's most significant bilateral fisheries relationship was with the Soviet Union. The Soviets in the 1960s initiated a major bilateral assistance program and coordinated the Six Party Mixed Commission for Fisheries Cooperation, including Cuba and the Eastern European satellite countries.[1467] As much as 85 percent of Cuba's foreign trade was with the Soviet Union and its Eastern European client states. The collapse of the Eastern European Communist Governments and the dissolution of the Soviet Union meant a wrenching change for Cuba which had to find new business partners. In terms of fisheries, while there were benefits to the Soviet fishing fleet, such as the establishment of a Western Hemisphere base port, the essential nature of the relationship was a foreign aid program and is thus discussed in the "C. Foreign Aid" section below.

Other countries: Cuban press reports indicate that Cuba has commercial contacts involving pelagic fisheries with an extensive list of foreign companies: Azaola Group (Spanish), Cofal Suki (Uruguayan/Spanish), Interflot (Russian-Spanish), ONA Group, V. Orlov Group, and Sjovik (Norway). Several companies have expressed an interest in purchasing pelagic fish from Cuba: AMORIN Tdg, Constante, Ilafood (French), J. Luyben, Parlevliet & Van Der Plas (Dutch).[1468] Few details are available, but the pelagic species involved are believed to be small pelagics, not large oceanic pelagics taken by longliners.

C. Foreign aid

1. Multilateral

The primary international organization which has provided fisheries development assistance to Cuba has been the Food and Agriculture Organization (FAO) of the United Nations. FAO has sponsored several development projects in Cuba. FAO assistance has focused primarily on supporting coastal fisheries and aquaculture. Several of these projects have helped improve current fisheries as well as the growing aquaculture industry. This is in sharp contrast to bilateral assistance programs which often focused more on developing distant-water fisheries. The Cuban Government in 1963 asked for assistance in modernizing its artisanal fishery targeting tuna and other large pelagics. The resulting project, conducted during 1966-71, was to assist Cuba improve the operations of its longline fleet targeting tunas, swordfish, billfish and other species. It was carried about by a Japanese longline specialist, Wataru Ichikawa, who recommended that the fishermen use relatively short longlines in the coastal waters rather than the hand lines they had been using.[1469] FAO has sponsored a variety of other projects in Cuba, including several directed at aquaculture, such as frog and shrimp [1470]

2. Bilateral (assistance to Cuba)

The modern Cuban fishing industry has been built with considerable foreign assistance. The Soviets were the primary contributor. Japan and Spain have provided considerable technical assistance, especially or the longline fishery, but their assistance has been primarily commercial exchanges associated with the sale of fishing vessels. The Soviet assistance included considerable grant aid, donated vessels (mostly trawlers), technical training, scholarships, and support from the Soviet Union's extensive distant-water research program. The Soviets helped build the infrastructure for a commercial fishing industry. This infrastructure proved very useful to the Cubans as a they built a commercial longline fleet. Soviet assistance also encouraged the Cubans to make a major commitment to distant-water fisheries at a time that coastal countries were restricting access to distant-wa ter fishermen. The result was the allocation of substantial resources to building an unprofitable distant-water fleet and the continuing drain of supporting that fleet over a 30-year period.

a. Japan

Japan has played a major role in the development of the Cuban tuna fishery over an extensive time period.

1930s: Cuban fishermen of Japanese ancestry introduced live-bait tuna fishing to Cuba in the 1930s. Japanese fishermen then figured prominently in the fishery as it developed.

1940s: Japanese fishermen, because of World War II, were restricted to inshore occupations.[1471]

1950s: In more recent years, Japanese assistance has played a major role in the development of the longline fishery. A Japanese longliner first demonstrated longline fishing from Havana in 1957, even before the Revolution. Three additional longliners began

operations in 1958. The Revolutionary Government that seized power in 1959 continue cooperation with the Japanese in longlining.

1960s: The new state-owned Cuban Fishing Fleet which was established by the Revolutionary Government decided to launch a commercial longline fishery. The first commercial Cuban commercial longliners were purchased in Japan (appendix A4a). Cuba purchased five medium-sized Delfín-class longliners purchased in Japan during 1962. Continued purchases eventually increase the fleet to 28 longliners by 1967. The longliners obtained in Japan varied from 250-600 GRT.[1472] The purchase of these vessels was a major financial commitment for Cuba. Unlike the vessels obtained from the Soviets and East Germans, the Japanese vessels had to be paid for in hard currency. They reflected, however, Castro's assumption that large boats and distant-water fisheries represented the future for Cuban fisheries.[1473] The Japanese played a major role in training Cuban fishermen how to operate longlines.[1474] The Cubans arranged for Japanese fishing masters to captain many of the original longliners in addition to many Japanese crew members to work with Cubans on the new vessels. Experienced Japanese fishermen served as instructors.[1475] The Cubans negotiated a 3-year technical agreement with the Japanese for 1963-65 to provide crew members and technical assistance in operating a commercial vessel and in conducting fishing operations. A substantial part of the crew on these vessels were Japanese. Initially some vessels had 50 percent Japanese crews. The number of Japanese and other foreign technicians on the Cuban vessels began to decline in 1965 after the completion of the initial 3-year technical agreement.[1476]

1970s: Some Japanese fishermen continued working on the Cuban longliners into the 1970s. The initial operations were conducted in the Gulf of Mexico, Caribbean, and Atlantic.[1477]

1980s: Some degree of cooperation continued between Cuba and Japan into the 1980s. The U.S. Coast Guard reported that a Cuban observer was aboard the Japanese longliner *Theresa* which was involved in a gear conflict with U.S. fishermen in the Gulf of Mexico during 1984.[1478]

b. Soviet Union

Soviet Fisheries Minister Alexander A. Ishkov initiated a fisheries assistance program with Cuba by signing a 10-year agreement in Havana during September 1962. The initial document involved an exchange of information and more importantly the creation of a Joint Commission on Fisheries. Cuban and Soviet fishery officials met again in 1963 and proceeded to plan a comprehensive fisheries development program.[1479] Several major decisions flowed from the first meeting of Soviet and Cuban officials, including details on the functioning of the Joint Commission on Fisheries. The Commission decided to meet annually and coordinate a comprehensive plan to support Cuban fisheries. The ensuing Soviet assistance and cooperative programs were thus coordinated through annual meetings of the Joint Commission. Soviet assistance was extensive and included: 1) subsidized fuel, 2) constructing a large modern fishing port at Havana, 3) providing fishing vessels (mostly trawlers),[1480] 4) providing spare parts, 5) offering fisheries research and oceanographic data and helping expand the Cuban marine science program, and 6) assisting with fleet operations such as at seas provisioning of distant water vessels, 7) helping to build processing plans, 8) providing trucks and other equipment, 9) training Cuban technicians, 10) shipments of frozen fish to supply the Cuban market.[1481]

One of the major Soviet projects was helping Cuba to launch a distant-water fishery in the Atlantic. Cuba has several important coastal stocks, but these coastal stocks would not support major increases in fishing effort. The Cubans rather decided to adopt the Soviet model of state corporations deploying large commercial vessels on distant-waters. The Cubans appear to have decided on this model before the Soviets committed to a fisheries assistance program, although the authors know of no published sources describing the chain of events and detailing just how Cuban leaders decided on launching a distant-water fishery. Soviet assistance helped the Cubans pursue the goal of launching distant-water operations and significantly widened the scope of the operations that could be initiated. The Soviets supplied several trawlers as well as crews to train Cuban fishermen. As late as the mid-1970s, Cuban trawlers still had substantial numbers of Soviet personnel serving as crew members, including the captain and first officers.[1482]

The first part of the Cuban distant-water program was the acquisition and deployment of commercial longliners targeting tuna. Distant-water longlining was initially conceived by the Cubans well before the Soviet assistance program began in 1962. In fact, commercial longlining trials with the Japanese were conducted in the 1950s before the Revolution. The Soviets agreed to assist the Cubans with their longline efforts. The Cubans and Soviets proceeded to conduct joint exploratory fishing and biological work, largely on Soviet research vessels. Studies were initiated in Cuban waters and offshore grounds that the Cubans and Russians were interested in fishing.[1483] Probably of greater long-term benefit to Cuba was that the Soviet

Photo 62.--The largest Soviet fisheries project was the construction of the Havana fishing port at a cost of about 35-50 million pesos. Note the trucks that the Soviets also supplied. D. Weidner

Extensive Soviet-Cuban fisheries cooperation continued until the Soviet Union was dissolved at the end of 1991. The most important element of the Soviet aid program to Cuba's distant-water operations was the overall fuel subsidy. This was critical to the Cuban economy because Cuba produces very little oil of its own and could not have financed the level of oil imports provided by the Soviets during the 1960s, 70s, and 80s. This was especially important for Cuba's energy-intensive distant-water fleet operations. The FAC in particular benefitted from Soviet fuel supplies. FAC longliners operating in the eastern Atlantic were refueled at sea by FAC tankers as well as Soviet tankers attached to their highseas fishing fleets.[1485]

assistance helped to significantly expand the Cuban marine science program and capability. The Soviets also began training Cubans aboard fishing vessels and providing scholarships to Soviet fishery institutes.[1484] Once the longline fishery was launched, the Soviets supported the Cubans through their existing network of supply vessels and tankers. The Soviet oil subsidy in particular was vital to the Cuban distant-water fleet.

The Soviet assistance program appears to have affected the direction of Cuba's distant-water development. Cuba's first distant-water vessels were longliners and a substantial fleet of about 26 longliners was completed during the early and mid-1960s (appendix A4). The Cubans, however, in the mid-1960s canceled plans for further longliner construction. The principal reason appears to have been the poor performance and substantial losses associated with the vessels (appendix A9). Instead the Cubans focused more heavily on trawling and except for one purseseiner, all the foreign vessels acquired after 1967 were trawlers. This of course was the principal method used by the Soviet fishing fleet and the Soviets could offer the Cubans their extensive expertise. Unfortunately for the Cubans, while the Soviets had vast experience and could provide support, the Soviet distant-water fishery was grossly inefficient (appendix A7). The Soviet distant-water trawl fishery was an energy intensive fishery required enormous quantities of oil and produced large quantities of low-value fish at great cost. Much of the Soviet assistance was used to support a similar costly Cuban undertaking.

Soviet assistance did nothing to improve the profitability of Cuban operations. In fact, by providing subsidized oil, the Soviets helped to promote inefficient, energy-intensive operations. The Cuban distant-water operations, however, appear to have run substantial deficits even with subsidized oil. The Cubans have never released information on the deficits incurred, in fact they may never have been calculated. Clearly they concluded early on that longlining was unprofitable (appendix A9). Considering the fact that the trawl fleet, especially after many countries declared 200-mile zones in the 1970s, was eventually deployed for low-value species like jack mackerel, the deficits associated with Soviet-style distant-water trawling may have even been greater than those associated with longlining. This may have especially been true because the trawl catch was largely marketed domestically.

Soviet assistance may in some ways done more harm than good to the Cuban economy. Purchasing oil at international prices would have been a limitation on the Cuban economy. It would have required, however, economic operations to more efficiently use fuel. It might have prevented the Cubans from launching costly, inefficient distant-water operations. The impact on the economy when the Soviets began to reduce the

fuel subsidy in the late 1980s, even before the Soviet Union dissolved, was devastating.

FCP trawlers: Denied subsidized fuel, the energy-intensive fleet of stern factory trawlers Cuba operated proved an unsustainable economic liability. As these vessels mostly supplied the domestic market, FCP simply could not afford to operate them.[1486]

FAC longliners: The FAC longliners proved a somewhat different matter. While the FAC needed to rationalize its operations, the fact that it produced fish such as tuna and swordfish which could be exported for hard currency meant that theoretically distant-water longline operations could be continued. The FAC longliners were, however, nearing their serviceable life and proved increasingly expensive to operate. Limited operations did continue until 1996 (appendix C8d2b) and one FAC longliner worked out of Bermuda in 1998-99. Fishing strategy after 1991, however, did not shift away from shark to more exportable species. Rather FAC increased the catch of non-exportable sharks (appendix C11c). The authors do not understand why FAC adopted this fishing strategy. It did, however, maximize the quantity of fish delivered to the Cuban domestic market.

The Soviet Union clearly made a substantial effort to assist Cuban develop a modern fishing industry. There were major accomplishments. Any assessment of the Soviet fishery assistance program to Cuba, however, would be mixed. The Soviet assistance program encouraged the Cubans to focus on unprofitable distant-water fisheries which drained resources away from more potentially productive undertakings.

Accomplishments: The Soviets can point to some significant accomplishments. The Soviets built the largest and most modern fishing port in the Caribbean at Havana. Soviets equipment and trucks helped to expand the processing and distribution network. Many Cubans received high-quality academic training in the Soviet Union helping Cuba significantly expand its marine science program. Research conducted with the Soviets greatly expanded Cuban knowledge of their marine ecosystem. The distant-water trawl fishery did supply substantial quantities of food for the domestic market, although generally low-quality product produced at considerable cost.

Wasted resources: The Soviet relationship may have been in the long-term very costly to the Cubans, impairing the development of an efficient fishing industry. Soviet assistance promoted Cuban investment in ill-conceived distant-water operations. Soviet advise and support encouraged President Castro's already existing penchant for large distant-water vessels. Cuba proceeded to allocate substantial scarce resources to building a fleet of distant-water longliners and trawlers in foreign shipyards and training crews. This proved to be a waste of available resources. Cuba's fleet of distant-water vessels consumed large quantities of fuel and operated at great expense. An impressive system of schools and training centers were established. The result now, however, is that Cuba has large numbers of unemployed fishermen and technicians because FAC and FCP and the distant-water fleet they operated has been drastically scaled back. Cuba at the same time was attempting to modernize its coastal fleet. Even a part of the resources devoted to the distant-water effort could have made a substantial improvement in the coastal fleet. The Soviet relationship also encouraged the Cubans to create state fishing corporations. The distant-water question aside, state fishing corporations in Latin America and most other countries, including the Soviet Union, have a dismal record of financial failure. Current Cuban thinking, in fact, is to give individual captains and crews, except for large commercial vessels, considerable autonomy, but retaining state ownership of the boats. Increasingly Cuban planners appear to be coming to the conclusion that large state fleets may well not be the way of obtaining maximum economic benefit from available resources. While the current regime in Cuba values the level of control afforded by a Soviet-style state corporation, they have apparently concluded that such enterprises were expensive and inefficient. The economic record of Cuba's state fishing companies during the 1960s-80s have to be considered in any assessment of the Soviet fisheries assistance program.

c. Other

Several other countries have provided some limited fisheries assistance to Cuba.

Canada: Canada has sponsored modest fisheries assistance projects in the Caribbean. The Canadian International Development Agency (CIDA) had a small assistance program in Cuba through the 1970s. The program was canceled in 1978 as a result of Cuba's military intervention in Angola. Canadian aid was resumed in 1994 following an appeal from Cuba for humanitarian assistance. Canada initially planned to send $1 million in food assistance.[1487] CIDA in 1996 funded a 5-year $1 million marine resources project. The project focuses on training, aquaculture (seaweed), and eco-tourism.[1488] A new report in 1998 indicated that the Canadian Government was considering the sale of used gillnet gear to Cuba that had been obtained in a buy-back program.[1489]

China: Cuba signed a fisheries agreement with China in 1992. The agreement provides for Chinese technical assistance for Cuba's aquaculture industry.[1490] The authors have few details on Chinese assistance, but note that expanding cultured harvests of fish, especially

tilapia have become an increasingly important component of the Cuban fishing industry.

France: France was reportedly considering a FAD project in 1999, but decided against it.

Russia: Some Russian officials, including President Yeltsin, after the dissolution of the Soviet Union at the end of 1991 expressed displeasure with Cuba's communist government. Russia soon took a more pragmatic course as officials in both countries who had worked together over 30 years sought to build a new relationship. A Russian desire to get something out of the enormous, and mostly unpaid, Soviet loans to Cuba was undoubtedly another factor. The two countries signed a new trade agreement in November 1992.[1491] Under President Yeltsin, ties with Cuba declined. President Putin's visit in 2001 signaled a renewed Russian interest in Cuba. While the future direction of Russian under President Putin is unclear at this time, it is clear that Russia simply does not have the economic capability to support the Cuban economy as the Soviets once did. While some economic and commercial projects are active, the authors know of no significant Russian fisheries assistance program currently active in Cuba. There is no longer a Fisheries Attache stationed at the Russian Embassy in Havana.[1492] Information on the extensive Cuban-Soviet relationship is detailed above under the Soviet Union.

Spain: Cuba purchased some of its first longliners in Spain (appendix A4a). The authors believe that the purchase of these vessels were commercial arrangements and have been unable to obtain further details on Spanish involvement in the development of the Cuban longline fishery. Some Spanish technicians are known to have worked aboard Cuban longliners, but the terms of their contracts are unknown.[1493] Cuban technicians have also been trained in Spain. While the Cubans purchased most of their tuna longliners in Spain, Cuban sources suggest that they hired more Japanese fishing experts than Spanish to work with their longline fleet.[1494]

United States: The United States does not provide Cuba fisheries assistance. The United States does, however, provide massive amounts of hard currency to Cuba. It is, of course, not Government funds, but money sent by Cuban-Americans to their families in Cuba. The precise amount is difficult to quantify, but probably accounts for about 10 percent of the Cuban economy, an enormous subsidy to the overall Cuban economy.[1495]

Other: Technicians from several other countries (including Denmark, France, Germany (DDR and DFR), Israel, Italy, Poland, Sweden, and others) have been reported in Cuba.[1496] The East Germans were involved in a variety of projects, especially building fishing vessels.[1497] The Western European countries were mostly working as part of projects installing processing plants and equipment. The EU has also sponsored a few small projects.[1498]

3. Bilateral (assistance from Cuba)

Cuba initiated an extensive assistance program of its own. It was primarily focused on Africa as part of Cuba's overall foreign policy.[1499] Cuba assistance took a variety of forms, one of the most common was providing doctors and other health workers, but involved a range of projects including agriculture, animal husbandry, education, sports, maritime transport, and other areas including fisheries. Fisheries played prominently in the Cuban effort. More than 15 countries received Cuban fisheries assistance, including: Algeria, Angola, Benin, Cape Verde, Chile, Grenada, Guinea, Guinea-Bissau, Jamaica, Mexico, Mozambique, Nicaragua, Sao Tome, Tanzania, Vietnam, Yemen, and other countries.[1500] Cuban assistance included technical assistance, boats (often ferro-cement), scholarships in Cuban schools, and other activities. Cuba was particularly interested during the late 1970s that FAO fund scholarships for Caribbean students in Cuban schools as part of the WECAFC project. After a trial run, several participating countries were reportedly dissatisfied with the training, in part because of the heavy political emphasis in the course work.[1501]

The assistance provided Grenada was of particular interest as fisheries figured prominently in the assistance program. The program included help in setting up a fisheries training school and staffing it with Cuban instructors. Cuba also provided about 9 ferro-cement fishing boats, four of which were rigged for longlining. The boats did not prove successful, but some Grenadian officials believe the training was useful because it focused on rudimentary technology that did not require expensive equipment. The Cuban training was in many ways the beginning of the Grenadian longline fishery.[1502]

XVII. Enforcement

Cuba has a very significant military capability, in Caribbean terms, as a result of massive assistance provided by the former Soviet Union. Given the substantial air and sea forces, the country has a greater enforcement capability than any other Latin American country. Actual surveillance has, however, been

limited by fuel shortages. There does not appear to be appreciable foreign fishing in Cuban waters. Distant-water fishing countries have reportedly very limited operations off Cuba (appendices C8g1-2). Most incidents with local countries have involved Cuban snapper/grouper fishermen. Fishermen from neighboring countries do not commonly fish off Cuba. The enforcement pattern with the United States is more complicated. Few of the incidents reported with neighboring countries have involved longliners.

The Cuban Navy is the country's primary marine enforcement force. The Cuban enforcement system, however, is somewhat different than that of neighboring countries. Cuban fishing vessels act as part of a nation-wide surveillance system. As part of the financial difficulties experienced by Cuba in the 1990s, Navy and Air Force patrols have been curtailed and the Cubans have relied more heavily on reports from their fishing vessels. A substantial, but unknown number of the crew members on these vessels are part of the Militia. They thus are, in effect, enforcement officers with powers of arrest. They do not, however, wear uniforms and there is no outward sign that they have enforcement powers. This has on occasion resulted in potentially dangerous confrontations because foreign fishermen do not commonly understand that some Cuban fishermen who do not wear uniforms have police power.

Some information is available on enforcement incidents with neighboring countries. The following is not a complete list of incidents, but does provide an indication of the nature of enforcement operations associated with Cuba.

Bahamas: Incidents are occasionally reported with t he Bahamas. Usually they involve small Cuban vess els fishing for snapper south of Andros and Ragged Islands. Bahamian authorities, for example, in 1966 arrested 13 Cubans for fishing off Inagua and subsequently fined them $3,700 and sentenced them to 6 months in jail. Cuban officials assured the Bahamians that the fishermen had strict instructions not to fish in Bahamian waters.[1503] Bahamian authorities arrested 20 Cubans fishing off Cay Verde in December 1975. The Cubans were taking grouper and other finfish. They were fined $30,000. A group of Cubans also arrested in December were released when they explained that they had entered Bahamian waters to avoid bad weather.[1504] The Bahamians arrested 17 Cubans on August 30, 1976 and fined them $10,250.[1505] Some Cuban fishermen have been attacked in Bahamian waters. Two boats were attacked west of Andros Island on October 4, 1993, and a fisherman killed. Cuban authorities later arrested 5 persons aboard U.S. registered boats who they believed to be responsible.[1506] Bahamian authorities aboard the *HMBS Flamingo* detected two Cuban fishing boats on May 12, 1980, operating in Bahamian waters near Ragged Island. The Bahamians fired on the Cuban boats when they attempted to evade arrest. Apparently

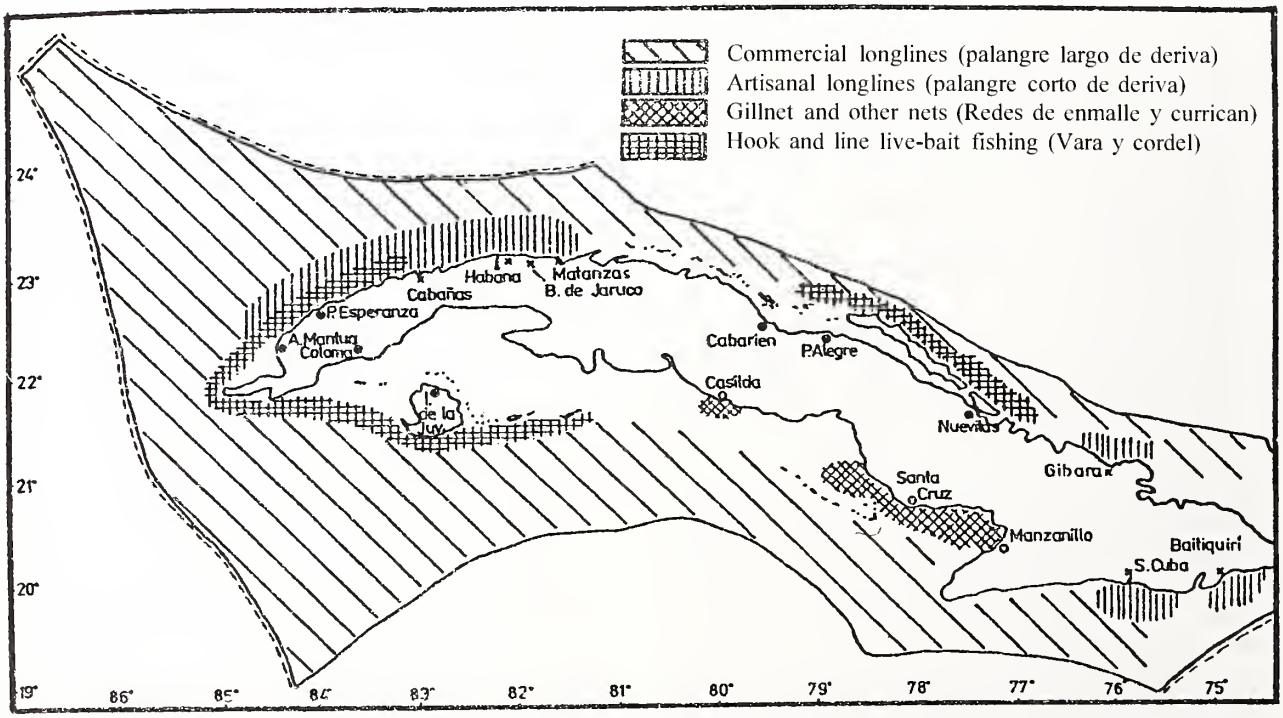


Figure 83.--The location of the Cuban off-shore (pesca de alto) fisheries and the ports from which they operate is shown here as well as the rough dimensions of the Cuban EEZ. Rodríguez

the Cuban fishermen radioed for help, reporting that they were being attacked by Cuban emigres. While escorting the Cuban fishing boats to a Bahamian port, the *HMBS Flamingo* was attacked by Cuban Air Force MIG fighters. The *HMBS Flamingo* was sunk and four crew members killed.[1507] The Bahamas reports arresting 22 Cubans and seizing four wooden boats in December 1985. The *HMBS Montagu* was buzzed by Cuban planes, but not attacked. The Cubans were taking finfish.[1508]

Canada: Cuban-Canadian fishery relations have been generally cordial. A few Cuban trawlers have been seized by the Canadians for illegal fishing. Three Cuban trawlers seized during November 1976 had Soviet captains.[1509] The authors noted another incident in 1985. Canada charged a Cuban fishing vessel captain with under-reporting 9.3 t of fishmeal reduced from fish caught in Canadian waters. He was fined only US$500, and no fish or fishmeal was seized.

Colombia: Three Colombian fishermen were released by Cuban authorities after a 4-year jail term for fishi ng in Cuban waters. They describe being held under deplorable conditions.[1510]

Dominican Republic: Cuba detained nine Dominica n fishermen in January 1980. Dominican officials indicated that they reached Cuba by mistake.[1511]

Haiti: No information available.

Jamaica: Cubans have escaped to Jamaica aboard fishing vessels. One group, for example, hijacked a shrimp trawler.[1512]

Mexico: Mexico seized four Cuban vessels that were targeting king mackerel on February 4, 1967 near El Cuyo off the northeastern corner of the Yucatán Peninsula.[1513] Mexican officials report that as many as 6 Cuban boats were seized, but about 40 Cuban boats were actually fishing. One source says that this was a common occurrence and that normally a few Cuban boats were posted to spot approaching Mexican patrol boats, but the fishing was so good that they neglected to do so on this occasion. Mexican officials were reportedly furious when the Cuban Consul-General in Merida harangued them for seizing the Cuban boats. The Cuban Consul-General reportedly accused the Mexicans of being "lackeys of the Yankee imperialists," and "misers indifferent to the hunger of the Cuban people." Various other rhetorical outbursts occurred.[1514] Mexican authorities seized five Cuban fishing vessels off Campeche June 30, 1976.[1515] Mexico seized a larger stern trawler, the *Moron* off Campeche on September 23, 1977.[1516] Another Cuban trawler was seized May 21, 1978.[1517] The authors have noted no seizures reported in the press since 1978, but our coverage of press reporting is incomplete.

United States: A variety of incidents concerning fishing boats have been reported by Cuban and U.S. authorities. Both Cuban and U.S. authorities have seized fishing boats from the other country. A wide range of fishing vessels have been involved, but rarely longliners. Incidents also occur when fishing boats are used by individuals seeking to leave each country. While this is mostly Cubans seeking to reach the United States. This is not always the case. Most of the incidents have been around Florida and Cuba, but a few incidents have also been reported off the U.S. northeastern coast where Cuba conducted a trawl fishery. Details on the nature of some of the enforcement actions include:

<u>1960s</u>: Cuban fishermen fished extensively in the Gulf of Mexico, including waters close to the Florida Coast and as far west as Texas.[1518] This continued until the United States declared a 200-mile zone in 1976.

<u>1970s</u>: The U.S. Coast Guard seized four FG boats off Dry Tortugas in February 1971. Cuban press reports referred to it as a kidnapping.[1519] In fact, some observers report that the Cubans sometimes provoked the incidents to use in their annual appeal to the Soviets for increased assistance. The U.S. Coast Guard in May 1971 seized four additional FG vessels 16 km north of Dry Tortugas.[1520] The U.S. seized

Photo 63.--A U.S. Coast Guard helicopter has a look at one of about 25 Cuban boats that entered U.S. waters in 1976, seeking shelter from rough weather.

four Cuban fishing boats in 1971, an unusually large number.[1521] A Cuban fishing boat in October 1973 was attacked in the Gulf of Mexico. The Cubans view this and similar attacks as "CIA-inspired acts of terrorism".[1522] There is no evidence to indicate that the CIA ever targeted Cuban fishing boats and in the 1970s was not supporting anti-Castro para-military groups. Attacks on Cuban boats began to receive increasing media attention in the 1970s and U.S. officials stepped up legal action against the Cuban-American extremists believed to be involved. The United States and Cuba in 1973 signed an agreement to control airline hijacking and piracy of vessels at sea. A wave of bombings occurred in Miami during 1974-76 directed at the FBI, Florida state prosecutors, and the Miami police force working to prevent attacks on Cuban boats.[1523] The U.S. Coast Guard seized the Cuban shrimp trawler E-39-SA on July 28, 1974. The U.S. Coast Guard seized the Cuban shrimp trawler E-82HB operating off Texas on August 2, 1975.[1524] The U.S. Coast Guard seized the Cuban trawler *Golfo de Tonkin* on January 7, 1976 and charged the captain with not returning lobster promptly. The U.S. Coast Guard seized the Cuban trawler *Playa de Varadero* off the northeast coast on August 17, 1975. Concern was expressed over failure to return lobster in a timely manner, but the vessel was released. The captain, first officer, and seven crew members were Soviet citizens.[1525] The U.S. Coast Guard seized the Cuban shrimp trawler E-82-HB on August 2, 1975. Two Cuban ferro-cement vessels were attacked in April 1976, presumably by Cuban emigres.[1526] The U.S. Coast Guard on May 11, 1976 stopped, but did not seize the Cuban trawler *Río Cauto* operating off the northeast coast.[1527] A similar incident was reported with the Cuban trawler *Playitas* on May 17, 1976.[1528] Cuba seized the U.S. lobster boat *Spirit of 76* in August 1976.[1529] After the U.S. 200-mile zone went into effect in 1977, Cuban fishing boats rarely entered U.S. waters. Perhaps in retaliation, Cuba stepped up enforcement actions against U.S. fishermen. Cuban authorities seized 14 U.S. fishing boats in 1977 through August. This included actions against both commercial fishing boats as well as recreational boats. U.S. sport fishermen, headed for the Caymans, in 1977 reported being approached by an unidentified boat without a flag. Thinking they were intent on robbing them, one of the Americans fired a small caliber pistol. The boat backed away, but was soon joined by Cuban fishing boats, a Cuban patrol boat, and MIG aircraft! One of the U.S. fishermen later told reporters that firing the pistol, "was the biggest mistake I made in my life."[1530] Fortunately the incident was resolved without injury. Cuba seized the U.S. shrimp boat *Bounty* on July 21, 1977 after a 2 hour chase.[1531]

1980s: Cuban authorities sized the *Kathy R* on March 6, 1980, while the boat was enroute from Key West to Conzumel, Mexico. Three Cubans who commandeered a fishing boat were tried in a Miami Federal court in December 1980. The Cuban captain testified against them.[1532] Cuba seized the Alabama-based U.S. shrimp trawler *Mercury* on January 1, 1981 off Pinar del Rio.[1533] Mariel Cubans stole the U.S. lobster boat *WBBZ* in September 1983 to return to Cuba. Two U.S. recreational fishermen were arrested by the Cubans in April 1984.[1534] Cuba seized two U.S. fishing boats, the *Raven* and *Sea Rider*, on October 21, 1984, according to Cuban authorities 14 km off Punta Fraile near Guantanamo. The vessels were heading for French Guiana. The Cubans seized the two vessels for allegedly entering Cuban territorial waters on October 21, 1984. The vessels were released November 4 after it was determined that the single radar was malfunctioning, giving false readings as to the distance offshore.[1535] Cubans used several fishing boats, *Carlos IV, Jorgito, Ramon Castell*, and *XI Festival* to flee the island in 1992.[1536] The environmental vessel *Sea Shepherd* attempting to publicize foreign fishing on depleted cod grounds, rammed a Cuban trawler off Canada during July 1993.[1537] Cuba in 1994 asked that the fishing boat *Plástico 11*, used by refugees, be returned.[1538]

Venezuela: The Cuban longliner *Alecrín* was fired on and seized by the Venezuelan Navy on November 20 1968, about 160 km north of Venezuela. The Venezuelan Navy was at the time very concerned about Cuban support of insurgent groups. The Cubans claim that they were in international waters when intercepted by the Venezuelans. As a result of the Venezuelan fire, the vessel almost sank.[1539] The *Alecrín* was held in the Venezuelan port of Carúpano for several months.

XVIII. Future Trends

The tuna and swordfish longline fishery was the first distant-water fishery that Cuba entered. Cuba had begun cooperating with Japanese longline fishermen even before the 1959 Revolution. President Castro has a history of interest in big, grandiose projects. He was an early advocate of acquiring large commercial fishing vessels and deploying them on distant grounds. The approach was further solidified when Soviet advisors arrived and promoted the idea of state-owned fishing fleets deploying both large longliners and trawlers on

distant grounds. As best the authors can tell, the Cubans made no cost-benefit analysis and simply assumed that large, modern looking distant-water vessels would yield profitable returns. The Cubans proceeded to invest millions of dollars of scarce hard currency in a distant-water fleet.

The results of Cuba's distant-water operations were a financial disaster. MIP has never released a realistic accounting of FCP and FAC operations. Cuba until the 1990s did not have even basic accounting standards and financial record keeping was perfunctory at best.[1540] As a result, a financial assessment of the two distant-water fleets may never have been made. The cost of the costly imported vessels, operating deficits, and lost opportunity costs must have totaled very significant amounts. Neither the longline nor the factory trawler fleets were able to conduct profitable operations in realistic terms. The Cubans, in fact, concluded soon after they had acquired their longline fleet in the mid-1960s that operations were not profitable. Notably, after 1967 Cuba canceled orders for additional longliners and never ordered even one single additional longliner. Subsequent efforts to acquire a tuna purse seine fleet failed.

FAC continued to operate its longline fleet in the 1970s and 80s. While they targeted yellowfin tuna, substantial shark and swordfish catches were reported. The yellowfin, bigeye, and swordfish catches as well as some of the billfish catch was exported, contributing to Cuban foreign exchange earnings. These earnings, along with subsidized Soviet fuel and low wages enabled the fleet to operate. After the dissolution of the Soviet Union at the end of 1991, the Cubans were forced to further curtail already scaled-back distant-water operations. Rising operating costs associated with the aging vessels was another serious problem. FAC continued limited distant-water longline operations through 1996. Reports suggest that FAC was basically closed in 1996, although a small office may still exist in MIP. The longliners have been sold or scrapped, although a few may still be idled in Havana. Curiously the focus of the Cuban longline fishery in the 1990s had shifted from primarily tuna for export to shark for the domestic market.

Cuban officials have not given up the idea of distant-water fisheries entirely. Some new vessels have been acquired, but they are all trawlers--deployed in a variety of joint-venture operations. The authors have no indication that Cuba plans to acquire any new longliners. Available information suggests some interest in possible tuna purse seining, but the authors have noted no interest in resuming distant-water longlining.

XIX. Special Note

A special note from the authors is necessary about our efforts to research the Cuban chapter of *World Swordfish Fisheries*. The authors have published a variety of reports on international fisheries since 1975. Some of these reports have touched upon or been about Cuban fisheries. As part of the information gathering process for these international reports, the authors as a first step contact the appropriate national fisheries agency in each country being studied. We explain the purpose and extend of our research project and request information. Only then do we begin our research. We do this both as a courtesy to inform officials that we are writing a report about their country's fishing industry and to obtain the most reliable information. After completing our research, we then provide each national fisheries agency as well as individuals contributing information a copy of the completed draft for their review and comments before actually publishing the report. This is important because it is each national fishing agency that obviously has detailed information about their own industry. We are also very interested in the view point of national fishery officials concerning their policies as well as their assessments of the issues under consideration. While we do not always agree with the opinions provided by foreign fisheries agencies, we believe it is important to fairly present those opinions so that U.S. readers will have a realistic background on policies and approaches in each country. When we disagree with the opinions and policies they provide, we still make every effort to fairly present such opposing points of view.

The Cuban Government is the only government to take issue with this process and accuse us of nefarious activities in over 25 years of preparing our international reports. Most other governments welcome the opportunity to provide information on their programs and activities and comment on our reports before publication.

Cuban Lt. Col. Lorenzo Aguilar Arredondo specializing in counter-intelligence has taken issue with this process. He has indirectly accused the authors of being part of an alleged CIA effort to contaminate Cuban shrimp ponds. He directly accused us of attempting to trick Government officials in providing information and then publishing false and misleading information about Cuba. The exact nature of the charge is difficult to translate. The Cuban accusations appeared in a Cuban Government internet site entitled "Pueblo de Cuba versus gobierno de U.S.A." ("The Cuban people against the U.S. Government"). The

charges were sandwiched between a long series of accusations against the Central Intelligence Agency (CIA).[1541] (The authors of course are employees of the U.S. Government, but not employees of the CIA.) The Cuban article after accusing CIA operatives of spreading diseases in Cuban shrimp farms reads:

> En agosto del 87 se recibe en el Ministerio de la Industria Pesquera, una carta enviada por el señor Dennis M. Weidner, funcionario de Asuntos Extranjeros. Esta decía que se estaba preparando un informe sobre la camaronicultura en países del mundo, y que se enviara información sobre Cuba. Que si le interesaba estaría encantado de enviar una información completa de los demás países. Del análisis de esta carta se comprobó cómo se dio información verdadera, falsa, distorsionada y en algunas de ellas se omitieron resultados obtenidos que ya eran de conocimiento público. Este método de sonsacar información se hace con el fin de estimular que la persona que responda, aporte elementos que permitan rectificar, verificar o ampliar la información que se está buscando y se desea obtener.

The Cuban charge is not clearly written, but it appears to suggest that the authors are trying to fool Cuban officials into providing information. It goes on to charge that the resulting article on Cuba was false and distorted and ignored publicly available information. The placement of this accusation, strongly suggests that the authors were part of an alleged CIA plot to sabotage the Cuban shrimp culture industry.

MIP officials for the most part have declined to provide information for the authors' international reports. The authors of this report find it difficult to understand why Lt. Col. Aguilar is so concerned about Cuban officials providing Cuban publications to the authors. Even more perplexing is why, after dissuading Cuban officials from providing information, Lt. Co. Aguilar would criticize the authors for: 1) trying to obtain information published in Cuba and 2) distorting the fisheries situation in Cuba because we neglected to include pertinent information. Of course the "pertinent" information was the very information we requested from MIP and what Lt. Col. Aguilar prevented us from receiving. The authors would have been pleased to have included any information which Cuban officials considered pertinent in order to better understand their country's fishing industry. Obviously, we could hardly include information which the Cuban Government refused to provide us. We feel it is most unfair to criticize us for not using published information which we requested and Cuban officials refused to provide.

The authors of this swordfish report have again repeatedly requested information from the Ministry of the Fishing Industry (MIP), the Flota Atunera de Pesca (FAC), the Centro de Investigaciones Pesqueros (CIP), and other Cuban agencies. We have also forwarded several copies of the draft text for corrections and comments. This has been done by both regular and electronic mail. We even wrote to Lt. Col. Aguilar to encourage him to provide pertinent information. We encouraged the Ministry to provide pertinent information and would have been interested in any comments or corrections to the text. The Ministry and former FAC officials now elsewhere employed in MIP are the real experts on their country's longline fishery. Their contributions would have been invaluable. If there are mistakes in our report we would like to correct them. If there are differences of opinion, we would like to fairly state the Cuban position and policy. The authors have made an effort in these reports to state all sides of the various controversies concerning the fishery. We were limited in this effort because it is frequently not possible to determine the actual state of affairs with the limited information available and the reluctance of Cuban officials to provide additional information. The authors also believe it important that American readers be acquainted with the varying views of the various groups involved in the fishery, directly or indirectly. We had hoped that Cuban officials would take this approach rather than wait until after the book is published and then complain that the authors are participating in a campaign against the Cuban people. Particularly unfortunate is the Cuban complaint that we are ignoring pertinent information which they decline to provide such information to us. We have made extensive use of Cuban publications in this report and would have been pleased to include any other publications that Cuban officials believe to be pertinent. At the time of publication, while we have received information from some CIP researchers, MIP officials have generally declined to provide information or official comments on the Cuban chapter of this book.

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Endnotes

SECTION I. (Overview)

1. The authors have received more comments on the overview section of this report than many of the more important sections dealing with swordfish. Many of the reactions have been predictable. Cuban dissident sources objected to some of the favorable passages about Cuba while sources more sympathetic to the Cuban Government objected to some of the critical passages. The authors did, however, receive some criticism from neutral sources. One insightful academic provided the following thoughtful comment, "In the 12 years that I have been involved with Cuban matters, I have often become frustrated with the lack of any real dialogue when issues of substance are discussed. Supporters and opponents of the Revolution have vested interests in interpreting the past according to their own wants, needs and goals. I have come to call this the 'Cuban dance'. It is one which very quickly descends, on both sides, into denunciation and often insult with little in the way of real dialogue. I have no illusions that I am free of ideology but in my research on the fishery, I have tried not to become a partner in the dance in the hope that some real advances in knowledge might be achieved. My first impression of your 'Overview' is that it perpetuates the dance. Its tone is very American, especially in its neglect of the very significant part played by the U. S. in Cuban affairs throughout this century from the Platt Amendment on. For example, the post-Revolutionary actions of Cuba and the Soviet Union are depicted as being some sort of planned sequence of events rather than the much more complex series of stimuli and responses between those two countries on the one hand and the United States on the other. A simple example: it is surely no accident that Fidel Castro's declaration of the socialist nature of the Revolution was made very shortly after the Bay of Pigs invasion of the island and yet no mention is made of it. This tone continues in the discussion of the history of Cuban fisheries. In my research, I found that the reality was much more complex than either the Cuban assessment or your account suggest. In conclusion, I wonder why the general history section is in the report. Is it really necessary? Your introduction to the swordfish fishery in Chile restricts itself to an overview of the fishery. I think that many potential readers of your report, in Latin America and elsewhere, will be turned off by the tone of the Overview and will regard the main part of the report as being similarly ideologically biased. This would be a pity." The academic involved asked that his name not be cited. He raises some valid points. The authors in fact agree with much of his comment. There are, however, some factors which make it difficult to follow his suggestion about the Overview. Of course the issues raised in the "Overview" can not be reasonably addressed in a few pages, but we feel compelled to provide a few brief comments. **History**: Limitations of time and focus prevent us from dealing in detail with the U.S.-Cuban relations before the Revolution and we do not disagree that our brief historical section simplifies a very complex relationship. We have added at the reviewers suggestion the Bay of pigs invasion to the historical synopsis. Readers are certainly encouraged to peruse the very considerable volume of scholarly literature on this subject. **Need for a synopsis**: The authors were indeed tempted to avoid even attempting the brief historical, economic, and political synopsis in the limited space available precisely for the reason alluded to. However, after some reflection we decided that it was just not possible for a reader to understand the Cuban tuna/swordfish fishery, especially the distant-water operations of the Flota Atunera de Cuba (FAC), without a basic understanding of the Cuban political and economic system. The system is so different from that of the other countries assessed in Vol. IV (Latin America) of the *World Swordfish Fishery* that we concluded an attempt to describe it was required. How could we explain why Cuba is the only Latin American country to pursue a large distant-water fishery? Or why Cuba made substantial investments of scarce foreign exchange in distant-water longliners when preliminary results showed such operations were not profitable? Or why money losing operations were continued for 3 decades? In addition, we have extensively used material from the Cuba media. Given the fact that the Cuban media often carries inaccurate and misleading information, a basic understanding of the nature of the Cuban state is needed to interpret the media reports. **American tone**: We have attempted to approach the question from a neutral position, although as mentioned no one is without personal biases. We accept the criticism that we have in some occasions not done this as well or as elegantly as we would like. We are not sure just what is meant by an "American tone", but assumes it refers to our description of Cuba as "a totalitarian state" and similar references. We view this as a statement of fact rather than an American view based on the dictionary definition, "of or related to centralized control by an autocratic leader or hierarchy". We accept that the word is value laden and that Cuban officials would object to its use and claim that their system is in fact democratic. While the authors accept the fact that such terms can discourage dialogue, we also maintain that some scholars to maintain contact with

Cuban officials for their research are forced to accept the official Cuban view at least in their published papers or avoid sensitive issues. We use the term because it is impossible to understand the process behind a decision to launch a costly and unprofitable distant-water fishery and continue it for three decades without understanding the autocratic nature of the Cuban political system. We note also that our report includes many positive references to the social achievements of the Revolution (racial justice, educational opportunity, and public health). Also when we discuss rationing, we do not simply use it as an indictment of the Revolution, but explain in a Latin American context that this guarantees a minimal level of food to the entire population. This is not what would be expected in a report that did not make an effort of a balanced approach. We stress that a balanced assessment does not necessarily reach a conclusion midway between two conflicting views. We also note that we have gone to great lengths to encourage Cuban officials to provide their view of the events discussed. **Conclusion**: The basic conclusion which we have reached concerning Cuba's distant-water longline fishery is undeniably critical: basically that Cuba is a country where economic and investment decisions are made at the top, often without careful economic analysis, and that it may not be wise for mid-level technical personnel to question those decisions. The lack of public accountability and the absence of an inquiring press means that costly mistakes can be made and than perpetuated for years. Of course costly mistakes are also made in market economies. They are less likely to be made with public funds and an independent media serves a useful purpose in ferreting out wasteful public programs. In addition, failing private enterprises usually quickly run out of funds and thus can not be perpetuated for extended periods. We have done our best to fairly describe the Cuban system. We freely accept that the information and tone will be criticized from different perspectives and leave it to the reader to form his or her own opinion.

2. The sequence of events was: April 15: Cuban exiles launch air attacks on Cuban airports. April 16: Burial ceremony for the Cubans killed in the air attacks. It was at this time Castro declared Cuba to be a socialist country. April 17: Exile forces land at the Bay of Pigs. April 20: After 4 days of fighting, the exile forces are defeated.

3. Manuel García Díaz, former Deputy Chairman of Cuba's Central Planning Council, interview by Russian correspondent Yevgeniy Bay, *Izvestiya*, morning edition, January 30, 1992. García Díaz, *op. cit.*, January 30, 1992.

4. García Díaz, *op. cit.*, January 30, 1992.

5. This is a good example of how difficult it is to evaluate Cuban conditions. In the U.S. press such facts are widely stated and the inference is that because older children do not have milk that conditions in Cuba are unacceptable. Almost always such comparisons are made with the United States. However, clearly a more valid comparison would be with other Caribbean or Latin America countries. Such comparisons are much more complicated, in part because conditions in neighboring Caribbean islands and even Central American countries are quite varied, ranging from desperately poor Haiti to the affluent Cayman Islands. It is true that in these countries milk is almost always available for purchase. Many low income families, however, can not afford to purchase it. This means that many children below age 6 do not have access to milk while in Cuba it is authorized for all children regardless of the family's income level, although the authors have no details on actual availability.

6. Manuel Achura Larraín, "Los antecedentes del plan perspectivo pesquero," *Informe al Gobierno de Cuba* N° AT 2268 (FAO: Rome, 1967), p. 10. This FAO report provides a fascinating view of the Cuban fishing industry at an early stage of its development.

7. The last Cuban fishery publication known by the authors to include production cost data was Guitart's excellent overview of the Cuban artisanal fishery in 1961-63. Guitart included some basic costs reported by the artisanal longline fishermen off Cuba's northwestern coast. Dario Guitart Manday, "Biologia pesquera del emperador o pez de espada, *Xiphias gladius* Linnaeus (Teleostomi: Xiphiidae) en las aguas de Cuba," *Poeyana*, serie B, no. 1, June 12, 1964, p. 31.

8. A Cuban researcher in 1964 reported that economic data was simply not available from fishermen's cooperatives. Guitart-Manday, "Biologia pesquera del emperador ...," *op. cit.*, p. 31. As a result, he compiled cost data using his pilot operation (appendix A11b). Subsequent Cuban authors assessing fisheries simply avoided the question of economics. A Canadian researcher reports similar difficulties getting data from Cuban companies. Ian T. Joyce, "Socialism and the fishery: A case study of the Cuban shrimp fishery," *The Canadian Geographer*, Vol. 43, no. 1, 1999, p. 63. The first systematic study of costs and revenues was undertaken in the shelf finfish fisheries beginning in 1988. It was finished in 1991. A Canadian researcher saw parts of it and summarized its conclusions in his thesis. Ian Joyce, Douglas College, personal communications, December 13, 2000. The authors do not know if a similar study was carried out by FAC and FLOCUBA. If so, such studies were neither widely distributed nor published.

9. Cuban officials constantly attribute Cuba's economic problems to external problems. The U.S. embargo is of course a favored target. See, for example, Paul Solman, "Blaming the blockade," PBS broadcast, July 18, 2001. (Transcript available on the PBS homepage.) The cut-off of Soviet assistance is also often cited. An assessment of Cuba's economic difficulties is a major topic far beyond the capabilities of this study. The authors only suggest

in passing that any such study must include an assessment of Cuba's domestic economic system which may in fact be the root cause of the economic difficulties rather than the external factors commonly cited.

10. U.S. Department of State, "Cuba," *op. cit.*, p. 3.

11. One report suggests that the decline in the GNP may have been as much as 60 percent from US$32.9 billion in 1991 to only US$12.8 billion in 1993. Armando Pérez with Douglas Rae, "Collapse of the Cuban shrimp fishery," draft paper, provided by the author August 27, 2001.

12. There are of course other debts, primarily to the Russians as the inheritor state of the old Soviet Union. Russian sources in 2000 estimate these debts total $20 billion. The authors are unsure as to the Cuban estimate.

13. At a conference aimed at attracting foreign investors, a "top central bank official" was asked why he refused to disclose figures on Cuba's currency reserves. His reply was, "Those who want to invest will be given a full picture of what they need to know in that sector." "Cuba goes fishing for foreign investment," *The Economist*, June 25, 1994, p. 41.

14. One can only wonder about the productivity of an economy where the most successful businesses are closed by the Government.

15. Elizardo Sánchez, interviewed by Paul Solman in a PBS special on Cuba, "Capitalism in Cuba," broadcasted July 17, 2001.

16. The farmer's markets were not a new experiment in 1994. They have been introduced earlier and achieved considerable success before Castro decided to close them down. Díaz García, *op. cit.*, January 30, 1992.

17. U.S. Department of State, "Cuba," *Background Notes*, April 1998.

18. Of course all of this is a huge departure from the early days of the Revolution when Castro sent accountants to work in agriculture because he did not think accounting was useful, productive work. García Díaz, *op. cit.*, January 30, 1992.

19. A Cuban Government internet posting, for example, indicated, "Since 1997, all of the Fishing Associations closed their annual financial books with profits. Since 1998, all of the 360 State Economic Organizations which they make up were profitable. Cubamar, "La pesca," internet posting accessed November 10, 2000: http://www2.cubamar.cu/anpp/lapesca.htm

20. A good example of this is the Instituto de Oceanología. The director is reportedly extremely frustrated as Cuba moves from a centrally planned economy in which funding was available from the Government to one in which even research institutes are being required to generate a substantial part of their own operating costs. Anonymous source, personal communications, December 12, 2000. Of course if research institutes are being pressured to generate some of their own operating costs, the Government must be placing even greater pressure on commercial enterprises. A good review of the changes underway in the fishing industry is available in Chuck Adams, Plácido Sánchez Vega, and Anicia García Alvarez, "An overview of the Cuban commercial fishing industry and recent changes in management structure and objectives," *EDIS Document*, No. FE-218 (Institute of Food and Agricultural Sciences: Gainesville, Florida, 2000), pp. 1-12.

21. In a fascinating special on Cuba, PBS interviewed a wide range of Cubans and one of the topics was the free market reforms. Journalist Paul Solomon, for example, interviewed students at the elite Lenin High School in Havana. We are not sure how the students were selected to attend the school. They were, however, ardent supporters of socialism. One of the students said, "We don't want capitalism. ... We want socialism, because we want equality to all the people." This was interesting in itself because none of the students saw the contradiction between exposing egalitarian socialism and attending an elite school. Also noticeable was the lack of debate on Solomon's questions and the seeming consensus among the students interviewed. Even more interesting was their attitude toward free market reforms. They did not see these reforms as a positive step, but rather as a temporary expedient to be done away with as soon as possible. One student explained, "We don't want those changes. We have to put them here ... They're there because we need them. When we don't ... If we don't need them anymore, we will fade it." This attitude reflects the view of many ranking officials which of course is why it is being taught in the schools. The question that the PBS special asked was if the reforms have gone so far that it will be impossible for the regime that follows Castro to resist the need to open the economy. Solomon phrased it will at the end of the program, "So, in the end we were left with one big question: Can Cuba, or any planned economy for that matter, encourage the free market and resist it at the same time? The only sure bet is that Cuba will grapple with that question for some time to come." Paul Solomon, "Capitalism in Cuba," PBS broadcast July 17, 2001.

22. E. Sánchez, *op. cit*, July 2001.

23. A joke current in 2001 involves a young lady who broke up with her fiance. She complains that he had lied to her about getting a job as a doorman at the Havana Libre Hotel (meaning access to dollars). Instead she grumbles, all he got was a new job as a neurosurgeon at a Havana hospital (meaning a peso salary).

24. García Díaz, *op. cit.*, January 39, 1992.

25. Jaime Suchlicki, "Castro's Cuba: More continuity than change," *Studies in Comparative International Development* Vol. 34, issue 4, pp. 123-136.
26. Joy Gordon, "Cuba's entrepreneurial socialism," *The Atlantic Monthly*, January 1997, pp. 18-30. Unfortunately because we are using an internet copy, precise page number citations are not possible.
27. This is an debate far beyond the limits of this study. The authors, however, felt it necessary to point this contentious debate as the Cuban claims about the embargo are so often repeated.
28. Paradoxically, despite the embargo and subsequent legislation, the United States is in fact the primary source of foreign assistance to Cuba--albeit unofficial aid. The U.S. State Department estimates that U.S. citizens and residents in 1999 forwarded nearly $1.00 billion in direct cash remittances ("remesas") and $0.35 billion in humanitarian donations to Cubans. This was primary Cuban Americans assisting their relatives in Cuba. Such remittances are very substantial amounts in a country with a total GDP of only about $12 billion. U.S. Ambassador James Cunningham, remarks during a U.N. General Assembly debate, November 9, 2000, Office of International Information Programs, internet site accessed December 27, 2000: http://www.usinfo.state.gov/regional/ar/us-cuba/cuba9.htm
29. Inter-American Commission on Human Rights, "Inter-American Commission on Human Rights report on Cuba," internet posting accessed December 1, 2000: http://www.fiu.edu/~fcf/IACHR.html
30. CEPEC, "Cuba: Información: Básica," internet site accessed November 20, 2000: http://www.infocex.cu/cepec/esp/informaciones/inf_bas.htm
31. U.S. Department of State, "Cuba," *Background Notes*, op. cit.
32. An overview of Cuban and other Caribbean fisheries during the 1950s is available in Reginald H. Fiedler, Milton Lobell, and Clarence Lucas, "The fisheries and fishery resources of the Caribbean area," *Fishery Leaflet* (Bureau of Commercial Fisheries: Washington, D.C., June 1957), 211p. A more detailed account provides an excellent assessment of the Cuban fishing industry in the 1940s, Joseph L. Martinez, "The Cuban fishing industry," *Fishery Leaflet* No. 308 (Bureau of Commercial Fisheries: Washington, D.C., March, 1948), 67p.
33. José Suárez Caabro, *Cuba y Su Pesca* (Miami, 1988), p. 34.
34. Jesús Abascal López, "Our catch will total 200,000 tons," *Mar y Pesca*, October 1977, pp. 9-18.
35. The official view is essentially that anyone between the fishermen and the consumer such as the boat owners and middlemen/wholesalers were not productive. The authors accept that some of these individuals did indeed take advantage of the fishermen. Whether "hosts" of middlemen did so is an open question. Some Cuban observers provide a more balanced view of this relationship. Suárez Caabro, *Cuba y Su Pesca*, *op. cit.*, p.51. The fact is that in a modern economy there is an important role for vessel owners as well as middlemen and wholesalers. These roles of course have not been eliminated in Cuba today. They have been replaced. The vessels are now owned by the state. The marketing agent is a state purchasing agency, AGEPEX. The fishermen are required to sell their catch to AGEPEX at prices set by MIP. Those prices are far below what the product would sell for on the open market. Except for the often unavailable fish ration, however, the retail prices paid by the consumer are according to the Government market prices.
36. A review of the pre-Revolutionary Cuban fishing industry is available in Suárez Caabro, *Cuba y Su Pesca, op. cit.*, pp. 30-51. Suárez Caabro writes, "I do not know just how the Cuban fishing industry would have developed if Cuba had proceeded with a democratic Government. But I am sure that it was not necessary to establish a totalitarian communist regime to continue improving the Cuban economy. Suárez Caabro, *Cuba y Su Pesca, op. cit.*, p. 51.
37. Fiedler, Lobell, and Lucas, "The fisheries ...," *op. cit.*, p. 100.
38. A. Pérez, *op. cit.*, August 28, 2001.
39. Roldolfo Claro, Julio P. Baisre, and Juan P. García-Arteaga, "Management of fishery resources," in R. Claro, L. Parenti, and K. Lineman, eds. *The Ecology of Marine Fishes of Cuba*, Ch. 8 (Smithsonian Press, in press 2001). An Irish journalist asked a Cuban fishermen what he thought about the Government's decision to change the nature of the fishing industry. He responded, "It suited us very well because we were getting many other things we never had before. For instance, we saw that the State was giving us free medical services we couldn't have afforded before, and our kids got new schools. Also food was made cheap, holidays cost us very little and fares also." Arthur Reynolds, "Cuba: One backward fishing fleet now prospers in three oceans," *The Irish Skipper*, April, 1985, p. 10.
40. Small artisanal craft operated by a single person with oars and sails were replaced with larger motorized boats operated by small crews. Many of the new boats were ferro-cement which while cheaper to build, were not fuel efficient. Thus the fuel requirements of the fishing industry increased.

41. Cuba was not the only country to adopt such policies. This initiative was most pronounced in the Soviet Union and its Eastern European client states, in part because these countries had no real way of determining actual production costs.
42. Joyce, *op. cit.*, November 27, 2000.
43. One researcher informs the authors that a few individuals were allowed to retain their vessels and in fact a few are still currently operated. He reports a small group fishing from Casilda along the south coast. They were using small vessels with sails. They did not have outboard motors. Joyce, *op. cit.*, December 13, 2000.
44. This information comes from a former Cuban fishing fleet official. Román González Pardo, testimony before the Senate Sub-committee on Internal Security (Miami, September 27, 1971).
45. The authors have noted a variety of dates for the U.S. embargo and as a result decided some basic information on the embargo and subsequent U.S. legislation on Cuba would be useful. **1960**: President Eisenhower, with the support of Congress, on July 6, 1960, after Cuba nationalized U.S. oil refineries and ordered the nationalization of all U.S. businesses and commercial properties, canceled Cuba's sugar quota. This marked the beginning of the use of U.S. trade sanctions against Cuba. After Cuba nationalized all remaining U.S.-owned businesses and real estate, President Eisenhower initiated the beginning of the Cuban embargo by imposing a partial embargo on U.S. shipments to Cuba. **1962**: President Kennedy on February 7, 1962, expanded the Cuban embargo to a total embargo except for the sale of non-subsidized food and medicines. The embargo is further tightened to include the import of all goods made from Cuban materials. **1966**: Additional measures imposed by President Johnson on November 12, 1966 outlawed food shipments to any country that sells or ships strategic or non-strategic goods to Cuba. **1977**: President Carter on March 19, 1977, dropped the ban on travel to Cuba and on U.S. citizens spending dollars in Cuba. **1982**: President Reagan on April 19, 1982, reinstated both the travel ban and the spending restriction. **1988**: President Reagan on August 23, 1988, also signed a Trade Act that eliminated restrictions on imports and exports of books, films, phonograph records and other informational materials to and from Cuba. **1992**: Rep. Robert Torricelli on February 5, 1992, introduced the "Cuban Democracy Act", a bill that establishes sanctions against countries "assisting" Cuba. The Act increased the restrictions on humanitarian aid, specifically food, medicines and medical supplies; permits telecommunication service between the United States and Cuba; refuses entry to any U.S. port to any vessel that has been to Cuba within the past 180 days; and further restricts remittances to Cubans who are planning to use the proceeds to travel to the United States. The Act allows for specific provisions of the law to be waived if several conditions are met by Cuba, including a commitment by their government to allow for free and fair elections. **1986**: President Clinton on March 12, 1996 signed the "Cuban Liberty and Democratic Solidarity (LIBERTAD) Act", after Cuba shot down two civilian aircraft piloted by Cuban Americans flying toward Cuba without authorization. The Act is also known as the "Helms-Burton Act," because of the joint sponsorship by Senator Jesse Helms and Rep. Dan Burton. This Act significantly tightened the embargo by further increasing the restrictions on family remittances; limiting the size of property claims; allowing for the filing of property claims in U.S. courts by persons who were Cuban citizens at the time of their property loss but are now U.S. citizens; punishing foreign companies that are using properties that were formerly owned by U.S. entities, by denying U.S. visas to their executives, stockholders, employees, and families; and by declaring it unlawful for any U.S. citizen or corporation to extend financing to any foreign person who "trafficks" in Cuban property formerly owned by a U.S. entity.
46. The Cuban merchant fleet, the Flota Mombisa, was in the 1970s the third largest in the Western Hemisphere, exceed only by that of the United States and Brazil. A retired Canadian naval officer and journalist provides a good look at Cuba's efforts to develop a maritime industry. John. D. Harbron, "Cuba's maritime outreach," published in 1978 but the name of the journal is not available.
47. Milan Kravanja, "Soviet and Cuban Fisheries in the Caribbean," in James D. Theberge, *Soviet Seapower in the Caribbean: Political and Strategic Implications* (Praeger: New York, 1972), pp. 145-146.
48. Actually the first steps taken by Revolutionary authorities was as early as February 17, 1959, with Ley 84 which created the Oficina de Fomento Marítimo Cubano (OFMC) which was headed by the Chief of Staff of the Navy. The OFMC was responsible for all marine activities, including he Merchant Marine, the fishing industry, sport fishing, and other marine tourist activities. The tourist activities were eventually transferred to another ministry. Responsibility for the fishing industry including the fishery cooperatives was given to the Instituto Nacional de la Reforma Agraria (INRA) by Resolución 17 on December 12, 1960.
49. The Cuban Government began promoting cooperatives in the 1940s. Joseph I. Martínez, "Cuban Government fosters fishing cooperatives," *Fishery Leaflet*, No. 250, part II (Fish and Wildlife Service: Washington, D.C., July 1947. pp. 17-19. After the Revolution the cooperatives were brought under state controlled and small-scale independent fishermen were compelled to join them.

50. Instituto Nacional de Pesca (INP), *La Industria Pesquera en Cuba* (Instituto Nacional de Pesca: Havana, October 1967), p. 26.
51. Alberto Iglesias, "Aumenta captura de langosta, pero no para la mesa de los cubanos," *CubaNet*, January 10, 2000.
52. Aldo Madruga, "Cuban fishing industry grows 7 percent in 1999," *Havana Granma International* (internet version), January 13, 2000.
53. A. Pérez with D. Rae, "Collapse ...," *op. cit.*
54. Pérez with Rae, "Collapse ...," *op. cit.*
55. For details see José A Suárez Caabro, *Cuba y Su Pesca* (Miami, 1988), pp. 59-63. Dr. Suárez's book also provides an excellent overview of the Cuban fishing industry.
56. The authors know of no published document. We have no information as to confidential assessments by Cuban fishery officials, but the decision appears to have been based largely on political factors and assumed economic benefits rather than carefully evaluated economic factors.
57. Milan Kravanja, NMFS, personal communications, June 7, 1996.
58. Rodríguez, *op. cit.*, September 16, 2001.
59. Rodríguez, *op. cit.*, September 13, 2001.
60. Rodríguez, *op. cit.*, September 13, 2001.
61. Some information on the Japanese role in the Brazilian longline fishery is available in the Brazilian chapter of this report.
62. It is not clear why FAC did not modify Cuban longline operations over time. Using the same gear and strategy during a period of significant innovation seems extraordinary. The focus on the same species (yellowfin tuna) throughout the conduct of the fishery and the decision not to add new vessels were key factors. Rodríguez, Nieto, and Muñoz, "Analisis de la abundancia ...," *op. cit.*, pp. 340. But why did the Cubans insist on maintaining the focus on yellowfin. Other countries such as Japan and Taiwan varied operations and at times fished heavily on bigeye and albacore as well. Several of the Cubans researchers active in the fishery are uncertain why FAC officials maintained the focus on yellowfin and continued using the same basic gear and fishing strategy. Muñoz, *op. cit.*, September 22, 2001; Pérez, *op. cit.*, September 22, 2001; and Rodríguez, *op. cit.*, September 13, 2001. The best explanation would seem to be bureaucratic inertia. Cuban planners disappointed with the productivity of the fishery seemed reluctant to make further investments in the fishery. There would be costs associated with gear innovations. Cuban captains once they learned how to operate the gear from their Japanese advisers, seemed disinclined to attempt innovations. This was probably a special problem in Cuba's closed society where exchanging information and experiences with foreigners is more difficult than in more open societies where there is a freer exchange of ideas. In addition, the structure of a state company affected innovation. In market economies where the captain is the boat owner or is paid a share of the catch, there is a very strong incentive to innovate. The financial inducements act to overcome a fisherman's often conservative inclinations. When the captain does not have such powerful financial inducements, he is much more inclined to stick with the methods with which he is familiar. A scientist working with the fishermen tells the authors that there was high interest on the part of the FAC captains in possible innovations. Rodríguez, *op. cit.*, October 7, 2001. This makes more puzzling why FAC continued with the same gear and methods. Compare the innovative approaches of Cuban longline fishermen operating much smaller boats in Miami, for example, to the FAC longliners.
63. The trawl fishery of course is not involved in fisheries for swordfish and oceanic pelagics. The authors have, however, decided to provide some basic background on Cuban distant-water trawl operations to provide a better understanding of the Cuban experience with distant-water fisheries so that the Cuban longline operation can be understood in the context of the overall fishery.
64. The inefficiency of Soviet operations was common knowledge in major fishing countries. This is a good example of how closing a society to foreign media and restricting the free exchange of ideas for ideological purposes can have very negative economic consequences.
65. There are many examples of similar decisions made by the Revolutionary Government in other economic sectors. Cuba officials often blame the economic failures of communist Cuba on sabotage and the U.S. embargo. There are in fact significant economic costs associated with the embargo. One wonders, however, if a realistic economic study of Cuba would show that the economic policies, poorly conceived investment decisions, misallocation of resources, policies toward incentives, and restrictions on private business have not done much more damage to the Cuban economy than any foreign enemy, actual or perceived.
66. Rodríguez, *op. cit.*, September 13, 2001.
67. Rodríguez, *op. cit.*, September 13, 2001.

68. For a list of where Cuba acquired its distant-water fleet see Dennis Weidner and David Hall, "Cuba," *World Fishing Fleets*, Vol. IV (NMFS, Silver Spring, Maryland, November, 1993), pp. 136-137. A detailed account of the fleet expansion is available in José A. Suárez Caabro, *El Fracaso de FLOCUBA: Orto y Ocaso de la Flota Cubana de Pesca* (Miami, 1994), 103p.
69. FAC did not regularly release annual statistics to the public. Much of their catch, however, was taken off West Africa and in the central Atlantic (FAO area 34). As a result, in most years, Cuban catches in FAO area 34 are a good rough approximation of FAC catch trends (appendix C1a2a-b).
70. Fisheries Minister Jorge Fernandez Cuervo, MIP, interview by a Cuban journalist, February 23, 1982, transcript provided the authors by the U.S. Interest Section, Havana, March 17, 1982
71. One source suggests that the Soviets came to provide nearly 40 percent of the Cuban food supply. Manuel García Díaz, former Deputy Chairman of Cuba's Central Planning Council, interview by Russian correspondent Yevgeniy Bay, *Izvestiya*, morning edition, January 30, 1992.
72. The oil subsidy was critical to the Cuban economy. Not only did it provide low-cost fuel that would have required the use of foreign currency, but the Soviets allowed the Cubans to sell some of the oil delivered to generate need foreign currency.
73. Cuban officials would obviously deny that the communist state-owned system is responsible for the country's economic failure. Instead they routinely blame the U.S. embargo for the country's ongoing economic problems. Never mentioned is that annual private remittances from the United States actually supply Cuba over $1.3 billion annually in foreign currency. An economic assessment of the Cuban economy is beyond the limitations of this study. The authors note, however, a basic contradiction in Cuban thought. Cuban officials criticize the United States for its "imperialistic" policies in Latin America and what they see as unfair trading and investment practices throughout the region and the developing world in general. It is some what contradictory, therefore, to also blame the United States (which because of the embargo has no trading contacts or investments in Cuba) for the failure of the Cuban economy. It is also worth noting that the reforms introduced after the Russians terminated aid were free market reforms. It was the decidedly capitalistic incentives to farmers and small-scale entrepreneurs and the success in attracting foreign investors that has helped resurrect Cuba's moribund socialist economy.
74. U.S. Department of State, "Cuba," *Background Notes*, *op. cit.*, p. 2. Estimating Soviet assistance is a challenging task. The authors have noted lower annual estimates of about $3 billion during the 1980s. What ever estimate is used, Soviet aid to Cuba was clearly sizeable and a major support to the Cuban Government.
75. The Soviets not only agreed to assist in the construction of the Havana fishing port, but also to cooperate with Cuban plans to conduct distant-water fisheries. The agreement was personally signed by then Premier of the Revolutionary Government Fidel Castro and Soviet Fisheries Minister A.A. Ishkov. "USSR-Cuban fishing base pact signed," Moscow radio broadcast, 1216 GMT, TASS, September 25, 1962.
76. Kravanja, "Soviet and Cuban fisheries ...," *op. cit.*, pp. 147-151.
77. An explosion occurred aboard the factory trawler *Playa Larga* about 480 km west of Oahu, Hawaii enroute from Panama. Injured crew members were taken to Oahu by a U.S. Coast Guard helicopter. U.S. Department of State, "'Playa Larga' in distress," message number 103280, April 5, 1985.
78. Cuban monthly rations, even in 1993, included 1 pound of fish, but notably no meat. *Miami Herald*, May 6, 1993. It is not known if the full ration is now regularly available. Some sources say that in recent years fish has rarely been available, but reports obtained by the authors vary. Canned fish (mackerel and sardine) from Chile is regularly sold through the ration card since 1998. A. Pérez, *op. cit.*, August 28, 2001.
79. Communist countries can often keep apparent prices low by drawing labor and materials from the domestic, closed economies. Domestic production costs cam be kept low by paying workers minimal wages and using domestically produced products. The Cuban jack mackerel fishery was a different matter. Not only was the fishery conducted with costly imported trawlers, but the distant-water operations using mid-water trawls required massive quantities of fuel. While the fuel was provided by the Soviets, the actual value of the fuel would have enabled the Cubans to have purchased large quantities of food more desirable than the jack mackerel that they actually produced at such high real costs.
80. For details on the Soviet-Cuban relationship see Dennis Weidner and Don Jacobson, "Soviet-Latin American fishery relations," *International Fishery Reports* (IFR/89-39), May 5, 1989.
81. Tracy Thomas and Dennis Weidner, "Cuban fishery relations in the Americas, 1959-88," *International Fishery Reports* (IFR-88/59), June 29, 1988.
82. Adams, Sánchez Vega, and Garcia Alvarez, "An overview ...," *op. cit.*, p. 2.
83. See for example these representative foreign assessments: Juan José Morales, "El milagro Cubano," *Técnica Pesquera* October, 1978, pp. 33-38; Juan Aguilar Derpich, "The island that discovered the sea," *Ceres*, July-August, p. 33-36; Antonio Bermudez Bilbao, "Cuba en la estela pesquera," *Industrias Pesqueras* October 15, 1989,

p. 13; Beate M.W. Ratter, "La pesca y los recursos pesqueros," internet sire accessed November 12, 2000: http://banrep.gov.co/blaavirtual/letra-f/fen/texto/medio/polamb1.htm; and Arthur Reynolds, "Cuba: Once-backward fishing fleet now prospers in three oceans," *The Irish Skipper*, April 1985, pp. 10-11, 18.
84. While a financial analysis would show very substantial costs, actual outlays after the vessels were purchased were more limited--primarily because the Soviets provided the fuel. Many of the other costs were peso costs which could be provided from the domestic economy. Such costs for unprofitable operations were a drag on the domestic economy, but were tolerated by Cuban officials because they did not involve extensive foreign currency outlays as long as the Soviets were willing to supply the fuel.
85. Cuba conducts one of the world's largest lobster fisheries. The 1999 catch was nearly 10,000 tons. This is an important source of export earnings. The fishery is well managed and highly profitable. Ian T. Joyce, "The spiny-lobster fishery in Cuba," *The Geographical Review* Vol. 87, No. 4, 1987. Income from the lobster fishery has been used to finance less profitable fisheries, especially the distant-water fishery. Georgina Bustamante, personal communications, August 7, 2001.
86. A. Pérez with D. Rae, "Collapse ...," *op. cit.*
87. See for example, "Cuba: F. Castro speaks on fish ponds at CTC Congress," Havana Radio Rebelde Network, 1700 GMT, April 29, 1996.
88. "Cuba extends rationing of basics to most goods," *Washington Post*, September 27, 1900.
89. U.S. Department of State, "Cuba," *op. cit.*, p. 3. Some estimates are much higher. One observer estimates a GNP fall of 60 percent during 1991-93. Pérez with Rae, "Collapse ...," *op. cit.*
90. Rodríguez, *op. cit.*, September 13, 2001.
91. Achura Larraín, "Los antecedentes ...," *op. cit.*, p. 10.
92. Rodríguez, *op. cit.*, September 16. 2001.
93. Rodríguez, *op. cit.*, September 16, 2001.
94. "Respuesta de los trabajadores de la FCP a misiva de Fidel," *Mar y Pesca*, April 1984, number 223, p. 3.
95. Rodríguez, *op. cit.*, September 16, 2001.
96. *Cuba News*, September, 1993, p. 3.
97. Tim Golden, "Castro's people try to absorb 'terrible blows'," *New York Times*, January 11, 1993.
98. Rodríguez, *op. cit.*, September 16, 2001.
99. The bonito catch was valued at about $1.2 per kg while lobster sold at about $10.0-12.0 per kilogram. Rodríguez, *op. cit.*, September 15, 2001.
100. Vessels have catch goals based on the previous 5-years results and on other factors such as gear, zone, vessel type, species, and crew size and experience. Monthly goals are set for quantity and quality. Fishermen received a bonus for meeting the goal and an additional award for exceeding it. J. Abascal, "Ahora nosotros mismos nos fijamos el salario," *Mar y Pesca*, No. 122, November 1975, pp. 24-29.
101. Joyce, "The spiny-lobster fishery in Cuba," *op. cit.*, p. 492.
102. Adams, Sánchez Vega, and García Alvarez, "An overview ...," *op. cit.*, p. 6.
103. The major exception are the Cuban fishermen still working on distant-water vessels.
104. Anonymous Cuban source, August 22, 2000. Before the 1990s reforms the "industry" was the MIP Departamento de Industria which in conjunction with the Departamento Extractivo made up the MIP Dirección de Plataforma. Rodríguez, *op. cit.*, September 16, 2001. The industry under the 1990s reforms is now essentially the APPs. The authors are unsure as to how the APP input concerning prices functions in practice. We know of no published assessment describing how this relationship realistically operates. It sounds like prices are set by two independent groups, the Government (MIP) and the fishermen ("the industry"). The industry in Cuba, however, is not independent from the Government. While it is true that the current provincial producer associations are not state agencies and the members not Government officials, it is also true that these associations are not independent bodies. Members and officers, within limits, can criticize MIP. Criticism is allowed as to price levels, what is not permitted is any collective action opposing state policies. The fishermen can not deny production to the Government company authorized to buy their catch, nor can the fishermen seek alternative purchasers. The fishery associations are required to sell their entire catch to one single Government buyer--the ACEPEX Government purchasing group. In addition, association officers who are too critical of MIPES may encounter a variety of career difficulties. The authors unfortunately have been unable to contact Cubans that were willing to speak frankly about this system.
105. Anicia García Alvarez, Centro de Investigaciones de Economía Internacional, Universidad de la Habana, personal communications, November 24, 2000.
106. Rodríguez, *op. cit.*, September 16, 2001.
107. "Tercer seminario sobre proceso inversionista en el MIP," *Mar y Pesca*, January 1990, number 292, pp. 31.

108. Anonymous FCP official, personal communications, October 7, 1993.
109. Anonymous FCP official, *op. cit.*, October 7, 1993.
110. Rodríguez, *op. cit.*, September 16, 2001.
111. J.R. Valdés, J. Dalmendray, R. Páez, and R. Domínguez, "La producción pesquera de la Flota Cubana de Pesca en el decenio 1981-1990," *Revista Cubana de Investigaciones Pesquera*, Vol. 18, No. 2, 1993-94, pp. 4-6.
112. Anonymous FCP source, *op. cit.*, October 7, 1993.
113. Rodríguez, *op. cit.*, September 22, 2001.
114. Adams, "An overview ...," *op. cit.*
115. Rodríguez, *op. cit.*, September 22, 2001.
116. J.A. Baisre, "Chronicle of Cuban marine fisheries (1935-1995): Trend analysis and fisheries potential," *FAO Fisheries Technical Paper*, No. 394 (FAO: Rome, 2000).
117. Baisre, "Chronicle ...," *op. cit.*
118. NMFS, *Our Living Resources*, various editions.
119. One Canadian researcher is especially impressed with the management of Cuba's lobster fishery. Joyce, "The spiny-lobster fishery in Cuba," *op. cit.*, pp. 484-503. Problems have been encountered, however, in the management of finfish. Ian T. Joyce, "The fisheries of the Cuban insular shelf: Culture, history an revolutionary performance," 1996, Ph D. dissertation, special arrangements, Simon Fraser University, Burnaby, B.C. Canada.
120. Oswaldo de Céspedes, "Fuel scarcity crimps economy in central Cuban province, *CubaNet*, August 28, 2000.
121. Madruga, "Cuban fishing industry grows ...," *op. cit.*
122. Great caution must be taken in using fisheries data published in the Cuban media. The 165,000 t catch is just one example. The data Cuba actually reports to FAO seems much more realistic. The authors can not speak to the precession of the data, but the trends reported do seem to be confirmed by available information on fleet and market trends. One respected Cuban researcher who worked on the shrimp fishery tells the authors that, "From my experience with shrimp reports, figures presented by FAO are generally acceptably accurate." A. Pérez, *op. cit.*, August 28, 2001.
123. Orlando Rodriguez Romay, *Granma International*, cited in "Cuba's rise in production," *Seafood International*, April 2000, p. 7.
124. Madruga, "Cuban fishing industry grows ...," *op. cit.*
125. "Cuba: Economy Minister comments on the fishing industry," Radio Havana, 0000 GMT, January 5, 1997.
126. "Cuba: Economy Minister comments on the fishing industry," *op. cit.*
127. Karen Myles, "Seafood smugglers face heavy fines," *FIS Hot News*, January 28, 2000.
128. "Cuba: Fishing industry first half earnings above forecast," Havana Radio Rebelde, 1135 GMT, July 30, 1997.
129. Anonymous FCP official, October 7, 1993.
130. *Granma International* as cited in "Cuban production increases," *Seafood International*, December 1997, p. 14.
131. *Granma International* as cited in "Cuban production increases," *Seafood International*, December 1997, p. 14.
132. The authors attempt to convert foreign currencies to U.S. dollars in most of the country chapters. As the Cuban peso is not freely convertible, such a calculation would be meaningless.
133. "Cuba: Fishing industry first half earnings above forecast," Havana Radio Rebelde, 1135 GMT, July 30, 1997.
134. Neil Inchcup, Seamont Fisheries (Bermuda) personal communications, June 9, 2000.
135. Madruga, "Cuban fishing industry grows ...," *op. cit.*
136. Madruga, "Cuban fishing industry grows ...," *op. cit.*
137. Cuba revised the catch data reported to FAO in 1999 (appendix C1a2b2). A tight printing schedule makes it possible to revise the data used in this book which was based on the data reported in the 1998 *Yearbook*. While the precise numbers were modified, there were no changes in the basic trends.
138. Luis Eustaquio, "Fishing industry reports on 1999 activity," *FIS Hot News*, February 24, 2000.
139. FIS Europe, "Cuban vessel to fish for shrimp in Canada," *FIS Hot News*, November 23, 1999.
140. FAO, *Yearbook of Fishery Statistics: Commodities*, 1998 (FAO: Rome, 2000), p. 37.
141. FAO, *Yearbook of Fishery Statistics: Commodities*, 1998 (FAO: Rome, 2000), p. 37.
142. Tania Díaz Castro, "La mesa vacía, ¡sin pescado!" *CubaNet*, January 27, 2000 and A. Pérez, *op. cit.*, August 28, 2001.
143. "Cuban aid for Galicia," *Spanish Fishing News*, August 27, 1992.
144. "Renovation hake vessels is underway," Fish Information Service, January 25, 2000.
145. INFOFISH, "Cuba/Spain: New trawlers in operation," *INFOFISH Trade News*, March 15, 1999.
146. "Renovation hake vessels is underway," Fish Information Service, January 25, 2000.
147. "Cuban vessel to fish for shrimp in Canada, Fish Information Service, November 23, 1999.
148. FIS, "Chinese delegation visits Cuba," *op. cit.*

149. FIS Europe, "AGECREW signs top contract," *op. cit.*
150. Alexander Wöstman, Venezuela to help restart Cuban refinery," *Alexander's Gas and Oil connections: News and Trends in Latin America*, February 7, 2000.
151. There are a variety of reasons why the data published by FAO sometimes differs from the data by any specific country. FAO adjusts the data received by each different country so that they are comparable. There are many different statistical variations in the data reported by different countries. One common difference is that FAO counts only the meat-weight of mollusks while other countries report the live-weight including the shell. The authors are unsure why the published FAO data differs from the data the Cuban Government releases to the media.
152. Emilio del Bario Menendez, "Fish farming workers reach 70,000 ton goal," *Granma* (Internet version), December 16, 1998.
153. Dennis Weidner, Tom Revord, Randy Wells, and Amir Manuar, "Cuba," *World Shrimp Culture*, Vol. IV, part 1 (NMFS: Silver Spring, Maryland, September 1992), pp. 205-245.
154. Madruga, "Cuban fishing industry grows 7 percent ..., *op. cit.*
155. Eustaquio, "Fishing industry reports ...," *op. cit.*
156. FAO, *Yearbook of Fishery Statistics: Aquaculture*, 1998 (FAO: Rome, 2000), p. 132.
157. Del Barrio Menendez, "Fish farming ...," *op. cit.*
158. FAO, *Yearbook of Fishery Statistics: Aquaculture*, 1998 (FAO: Rome, 2000), p. 132.
159. Cuba has exported 43-177 t of fishmeal annually during 1996-98. FAO, *Yearbook of Fishery Statistics: Products*, 1998 (FAO: Rome, 2000), p. 37.
160. Theoretically export earnings from the shrimp sales could finance fishmeal imports. The amount of export earnings available for such purposes will depend on the profitability of the shrimp farms.
161. Keith Nuthall, "Boom time! FAO predicts huge expansion," *Fish Farming International*, September 2000, p. 1.
162. Jesús Abascal López, "Developments of fishing industry surveyed," *Mar y Pesca*, October 1977, pp. 9-18.
163. An insightful assessment of Cuba's most valuable fishery, the lobster fishery, suggests that it is one of the best managed lobster fisheries in the world, in part because Cuba's political system allows tight controls on fishing effort. Joyce, "The spiny-lobster fishery in Cuba," *op. cit.*, pp. 484-503. The same author, however, provides a more mixed picture in management of the shrimp fishery, the shrimp fishery. Joyce, "Socialism and the fishery...," *op. cit.*, pp. 53-69. The management of finfish fisheries have proven much less successful and by the 1990s were generally unprofitable. Fisheries management is discussed in detail in Joyce's thesis. Joyce, personal communications, *op. cit.*, December 13, 2000. Cuban officials have in fact noted the heavily exploited status of Cuban stocks. Baisre, "Chronicle of Cuban marine fisheries ...," *op. cit.* The problems encountered are, of course, not dissimilar to those encountered in many other countries, but Cuba's economic problems make it very difficult to address those problems.
164. Adams, "An overview ...," *op. cit.*
165. Suárez Caabro, *op. cit.*, September 8, 1993.
166. The Cuban orders for the Río Damují-class trawlers were placed in Spanish shipyards before the United States declared a 200-mile fishing zone. The Cubans then pursued fishery negotiations with the United States, especially during the Carter Administration (1977-81), but significant access was never obtained. The U.S. action declaring a 200-mile zone was not a surprise development, although the timing could not have been predicted. Given the magnitude of the Cuban investment and the plans to target grounds off the United States, one night have anticipated that Cuban officials would have looked into the possibility of a U.S. 200-mile fishing zone with more care.
167. Rodríguez, *op. cit.*, September 16, 2001.
168. Cubamar, "La pesca," *op. cit.*
169. A. Pérez and D. Rae, "Collapse ...," *op. cit.*
170. Julio Baisre, Director of Fisheries Management, Ministerio de la Industria Pesquera, personal communications, October 9, 2000.
171. FIS Europe, "AGECREW signs top contract," *FIS Hot News*, October 25, 1999 and Adolfo Puente, Gerente, AGECREW, personal communications, November 10, 2000.
172. One CIP biologist working with the pelagic fishery reports asking friends which were economists about the profitability of FAC operations and being told that they in fact had no idea. Luis Muñoz, personal communications, August 14, 2001.
173. Rodríguez, *op. cit.*, September 16, 2001.

SECTION II. (Species)

174. The first Cuban paper specifically on swordfish know to the authors is the excellent 1964 report, Guitart, "Biología pesquera ...," *op. cit.* The report addresses the Cuban artisanal fishery off the northwest coast. Two later papers are L. Muñoz, A. Rodríguez, S. Moreno, and J. Pol, "Características biológico-pesqueras del emperador (*Xiphias gladius*) en las noroccidente de Cuba," *Rev. Cub. Inv. Pesq*, Vol 1, 1990 and A. Rodríguez, L. Muñoz, S. Moreno, and J. Pol, "Características del emperador (*Xiphias gladius*) en las proximidades de Cuba," *ICCAT Collected Volume of Scientific Papers*, Vol 29 (ICCAT: Madrid, 1989), pp. 165-177. These papers describe swordfish off Cuba. Many other Cuban reports have addressed the artisanal fishery, but these are the only reports known to the authors that specifically focus on swordfish. The authors know of no Cuban report addressing the much larger quantities of swordfish take in the commercial longline fishery in the eastern and central Atlantic.
175. The FAC researchers report that FAC and CIP sponsored research on tunas based on data collected from the commercial longline fishery in the Atlantic. Andrés Rodríguez, Fishery Biologist. FAC, personal communications, March 16, 1981. See for example S. Valle and A. Rodríguez. "Análisis de cohortes de la pesquería del atún ojo grande (*Thunnus obesus*) en el Océano Atlántico," CIP, 1978; S. Valle, N. Mesenteva, and A. Rodríguez, "Nota sobre el contenido estomacal del atún ojo grande (*Thunnus obesus*) en el Atlántico centro oriental," October 1978; and A. Rodríguez, S. Valle, and R. Valdés," Composición por largo y proporción entre los sexos del atún aleta amarilla (*Thunnus albacares*) en el Atlántico centro-oriental," undated report probably prepared about 1979.
176. Rodríguez, *op. cit.*, September 16, 2001.
177. The best overview of the distant-water longline fishery is A. Rodríguez Rodríguez, S.F. Nieto Misas, L. Muñoz Uribarre, "Análisis de la abundancia (1973-1985) de grandes pelagicos en la zona oceanica del Atlántico tropical oriental," *ICCAT Collected Volume of Scientific Papers*, (SCRS/87/24), vol. 28 (ICCAT: Madrid: 1988), pp. 339-349. Interestingly, Rodríguez and his colleagues point out that the consistency in vessels, gear, and methods of the Cuban fleet during the 1960s, 70s, and 80s has meant that the data compiled by the fleet is not affected by many variables introduced by more innovative fleets like the fleets from Japan and Taiwan. See for example, S. Zusuki and S. Kume, "Fishing efficiency of deep longline for bigeye tuna in the Atlantic as inferred from the operation on the Pacific and Indian Oceans," *ICCAT Collected Volume of Scientific Papers* (SCRS/81/6), Vol. 17, No. 2 (ICCAT: Madrid, 1982), pp. 471-476).
178. The Cuban Centro de Investigaciones Pesqueras (CIP) contributed specimens and cooperated with the study. George F. Arata, Jr., "A contribution to the life history of the swordfish, *Xiphias gladius* Linnaeus, from the south Atlantic coast of the United States and the Gulf of Mexico," *Bulletin of Marine Science of the Gulf and Caribbean*, Vol. 4, No. 3, 1953, pp. 184-243.
179. Arata, "A contribution ...," *op. cit.*, 1954, Vol. 4, pp. 183-243; E.L. Arnold, Jr., "Notes on the capture of young sailfish and swordfish in the Gulf of Mexico," 1955, *Copeia* pp. 150-151; H.W. Sims, Jr., "Plankton collection with pertinent data: Yucatán and Florida Straits (August 1962-August 1963) *Florida Board of Conservation Marine Research Laboratory Special Scientific Report*, 1966, No. 14; G.E. Markle, "Distribution of larval swordfish in the northwest Atlantic Ocean," *NOAA Technical Report* (SSRF-675), 1974, pp. 252-260.
180. Fishermen from Cojimar, a small fishing port a few kilometers east of Havana report taking a swordfish on September 9, 1942, with ovaries 2 feet long and 5 inches at the greatest diameter. The eggs were ready to rupture the membrane. Other fishermen took a 136 kg swordfish in 1941 that had 11 kg ovaries. The fishermen report that females with ripe ovaries were often encountered along the northwestern Cuban coast, often accompanied by a smaller fish--presumably the male. F. LaMonte, "Note on breeding ground of blue marlin and swordfish off Cuba," *Copeia*, December 26, 1944, No. 4, p. 258.
181. J.S. Ault, T.R. Capo, J. Luo, S.A. Luthy, J.E. Serafy, P.W. Walsh, and D. de Sylva, "Assessing sailfish populations in the Straits of Florida," *Proceedings of the Gulf and Caribbean Fisheries Institute, 1998*, vol. 51. One important goal of the project is to develop detailed criteria for identifying the larvae of each billfish species. Jerole Ault, University of Miami, personal communications, March 30, 2000.
182. F. Arocha and D. Lee, "Maturity at size, reproductive seasonality, spawning frequency, fecundity and sex ratio in swordfish from the Northwest Atlantic," *ICCAT Collective Volume of Scientific Papers*, Vol. 45, No. 2, SCRS/95/98 (ICCAT: Madrid, 1996), pp. 350-357.
183. Charlene Grall and Donald P. de Sylva, "Distribution, relative abundance, and seasonality of swordfish larvae," *Transactions of the American Fisheries Society*, Vol. 112, 1983, pp. 239, 243-244.
184. John Jeffrey Govoni, Bruce Stender, and Oleg Pasuk, "Distribution of larval swordfish, *Xiphias gladius,* and probable spawning off the southeastern United States," in press, advanced copy provided the authors in November 1998.
185. Govoni, Stender, and Pasuk, "Distribution of larval swordfish ...," *op. cit.*
186. Grall, de Sylva, and Houde, "Distribution ...," p. 235
187. Grall and de Sylva, "Distribution ...," *op. cit.*, pp. 239, 243-244.

188. Guitart Manday, "Las pesquerias pelágico-oceanicas ...," *op. cit.*, p. 24.
189. Muñoz, Moreno, Rodríguez, and Pol, "Características bilógico-pesqueras ...," *op. cit.*, p.48.
190. L. Espinosa, M. Sosa, S. Moreno, and R. Quevedo, "Aspectos biológicos de los peces de pico en la región noroccidental de Cuba," *Collective Volume of Scientific Papers* Vol. 28 (ICCAT: Madrid: 1988), p. 270.
191. Muñoz, Moreno, Rodríguez, and Pol, "Características bilógico-pesqueras ...," *op. cit.*, p. 49.
192. LaMonte, "Notes on breeding grounds ...," *op. cit.*, p. 258
193. Guitart Manday, "Las pesquerias pelágico-oceanicas ..., " *op. cit.*, p. 25.
194. In the Cuban study we have the results are not corrected for sampling intensity, thus making it difficult to fully interpret the results.
195. A. Rodríguez, L. Muñoz, M.P. Frias, S. Moreno, and J. Pol, "Caracteristicas del emperador (*Xiphias gladius*) en las proximidades de Cuba," *ICCAT Collective Volume of Scientific Papers*, (SCRS/88/16) Vol. 29 (ICCAT: Madrid, 1989), pp. 165-177. A Cuban researcher indicates that his colleagues M. Juárez and M. Montolio have done further research on swordfish larvae, but the authors have been unable to find the published work.
196. S. Moreno, J. Pol, and L. Muñoz, "Influencia de la luna en la abundancia del emperador," *ICCAT Collected Volumes of Scientific Reports*, Vol. XXXV, (ICCAT: Madrid, 1991), p. 508-510.
197. Guitart Manday, "Biología pesquera ...," *op. cit.*, pp. 19-21. English readers need to be careful with the term "full moon". In Spanish the term is "luna nueva" or new moon. This is just the opposite of the English-language term "new moon" which is the lunar phase where the least amount of sunlight is reflected.
198. Beckett discusses north south movement in general and not just the observation for the fish off northwestern Cuba or in the Florida Straits. Beckett, "Biology of swordfish ...," *op. cit.*
199. For example see the Chilean chapter of this report. Dennis Weidner and Julio Serrano, "Chile" *World Swordfish Fisheries*, IV. A.1.b. (NMFS; Silver Spring, 1997, pp. 471-475.
200. Espinosa, Sosa, Moreno, and Quevedo, "Aspectos biológicos ...," *op. cit.*, pp. 273-274.
201. Cuban fishermen have tagged pelagic fish. Tagging appears to have been conducted in Cuban waters and not as part of the FAC has tagged fish in its eastern and central Atlantic operations. One report indicated that the Cubans tagged 902 fish in 1982. The species are not available, but they may have been mostly tunas or billfish--presumably mostly the skipjack and other small tunas targeted by the baitboat fishery in Cuban waters. One tag return was also reported in 1982, again the species is unknown. Presumably similar activities occurred in other years. In some years the Cubans reported on their tagging activities to ICCAT. One such report indicated that 591 fish were tagged in 1981 and 712 fish in 1982 using yellow tags. B. García Morena and A. Rodríguez, "Cuban tuna fisheries in the Atlantic Ocean and research activities carried out in 1981 and 1982, *ICCAT Report for the Biennial Period, 1982-83*, part 1, 1982 (ICCAT: Madrid, 1983), pp. 234-235. Mostly skipjack and blackfin were tagged, suggesting that the tagging was carried out in coastal waters on fish targeted by the baitboat fleet. The authors, however, know of no published report summarizing the Cuban tagging program or findings from tag returns, except for skipjack and blackfin. The authors believe that few if any swordfish were tagged because the authors know of no Cubans tags ever retrieved (Caribbean Overview, appendix C3). The question of Cuban policies toward returning tags is discussed in "XIV. Research."
202. LaMonte, "Note on breeding grounds ..., " *op. cit.*, p.258 and Guitart, "Biología pesquera ...," *op. cit.*, p. 25.
203. Moreno, Pol, Muñoz, "Influencia de la luna ...," *op. cit.*, p. 510.
204. Rodríguez, Muñoz, Frias, Moreno, and Pol, "Caracteristicas del emperador ...," *op. cit.*, p. 174.
205. Muñoz, Moreno, Rodríguez, and Pol, "Características bilógico-pesqueras ...," *op. cit.*, p. 49.
206. Guitart Manday, "Las pesquerias pelágico-oceanicas ...," *op. cit.*, p. 25.
207. Muñoz, Moreno, Rodríguez, and Pol, "Características biológico-pesqueras del emperador ...," *op. cit*, p. 53.
208. Sonia Moreno and Jorge P. Pol, "Contribución al estudio de las pesquerías con palangre de deriva en la costa noroccidental de Cuba," CIP, *I Cong. Cienc. Cuba,* Havana, 1985, p. 195.
209. Rodríguez, Muñoz, Frias, Moreno, and Pol, "Caracteristicas del emperador ...," *op. cit.*, p. 174.
210. A. Rodríguez, S. Nieto, and P.O. Castro, "Aspectos comparativos de la pesqueria cubana se tunidos y afines en el Atlántico centrorinental y centroccidental," *ICCAT Collective Volume of Scientific Papers* (SCRS/90/60), Vol. 35 (ICCAT: Madrid, 1991), p. 175 and Rodríguez, Muñoz, Frias, Moreno, and Pol, "Caracteristicas del emperador ...," *op. cit.*, p. 174.
211. Rodríguez, Muñoz, Frias, Moreno, and Pol, "Caracteristicas del emperador ...," *op. cit.*, p. 167. See also appendix B1d.
212. Espinoza, Sosa, Moreno, and Quevedo, "Aspectos biológicos ...," *op. cit.*, pp. 266-286.
213. The FAC data is in terms of number of individual fish. Rodríguez, Nieto, and Muñoz, "Analisis de la abundancia ...," *op. cit.*, pp. 343.

214. Jean Cramer, "Recent trends in the catch of undersized swordfish by the pelagic longline fishery," *Marine Fisheries Review*, March 1996, Vol. 58, pp. 24-32.
215. See the Bahamian chapter of this report for details.
216. For details see "Spawning" in the Caribbean Overview.
217. Rodríguez, Nieto, Castro, "Aspectos comparativos ...," *op. cit.*, p. 174 and L. Muñoz, S. Moreno, and A. Rodríguez, "Características biológico-pesqueras de emperador (*Xiphias gladius*) en el noroccidental de Cuba," *I Congreso de Ciencias del Mar,* June 9-12, 1987, Havana, Cuba.
218. Rodríguez, *op. cit.*, September 16, 2001.
219. L. Muñoz, S. Moreno, A. Rodríguez, and J. Pol, "Características biológico-pesqueras del emperador (*Xiphias gladius*) en el noroccidente de Cuba," *Revista Cubana de Investigaciones Pesqueras*, 1990, Vol. XV, No. 1-4, p 4.
220. Guitart, "Biologia pesquera ...," *op. cit.*, pp. 8-14; Muñoz, Moreno, Rodríguez, and Pol, "Características biológico-pesqueras ...," *op. cit.*, pp. 47-48 and 56; and Anonymous, "Report of the swordfish assessment workshop," *Collective Volume of Scientific Papers*, Vol. 26, 1986, SCRS/86/25 (ICCAT: Madrid, 1987).
221. F.R. LaMonte and D.E. Marcy, "Swordfish, sailfish, marlin, and spearfish," *Ichty. Contrib. International Game Fish Association*, Vol. I, No. 2, 1941.
222. Guitart, "Biología pesquera ...," *op. cit.*, pp. 24-25).
223. Guitart Manday, " Las pesquerias pelágico-oceanicas ...," *op. cit.*, p. 25.
224. Cramer, "Recent trends ...," *op. cit.*, pp. 24-32.
225. See the Bahamian chapter of this report for details.
226. Cramer, "Recent trends ..., " *op. cit.*, pp. 24-32.
227. See for example Guitart, "Biología pesquera ...," *op. cit.,* pp. 8-14.
228. The most recent Cuban study known to the authors with extensive size and weight data is Espinosa, Sosa, Moreno, and Quevedo, "Aspectos biológicos ...," *op. cit.*, pp. 266-286. They mention on page 274 problems comparing their results with previous studies.
229. The reader must always be cautious in using fisheries-dependant data as an abundance measure. Such data can be affected by a variety of factors such as gear, methods, climatic variations, and other variables besides actual abundance.
230. Dario Guitart Manday, "Biologia pesquera del emperador o pez espada, (*Xiphias gladius* Linnaeus (Teleostomi: Xiphiidae) en aguas de Cuba," *Poeyana*, 1964, Serie B, No. 1, pp. 15-16.
231. Muñoz, Moreno, Rodríguez, and Pol, "Características biológico-pesqueras ...," p. 48.
232. Muñoz, Moreno, Rodríguez, and Pol, "Caracteristicas biológico-pesqueras ...," *op. cit.*
233. Muñoz, Moreno, Rodríguez, and Pol, "Características biológico-pesqueras ...," p. 45.
234. Espinosa, Sosa, Moreno, and Quevedo, "Aspectos biológicos ...," *op. cit.*, pp. 270-271.
235. Pomfrets and squid reportedly constitute nearly 70 percent of the diet. Guitart-Manday, "Biologia pesquera del emperador...," *op. cit.*, pp. 6-7.
236. Rodríguez, Nieto, and Muñoz, "Analisis de la abundancia ...," *op. cit.*, pp. 341 and 346.
237. Rodríguez, Nieto, and Muñoz, "Analisis de la abundancia ...," *op. cit.*, pp. 341 and 346.
238. Rodríguez, Nieto, and Muñoz, "Analisis de la abundancia ...," *op. cit.*, pp. 343 and 346.
239. Rodríguez, Nieto, and Muñoz, "Analisis de la abundancia ...," *op. cit.*, pp. 343 and 349.
240. Rodríguez, Nieto, and Muñoz, "Analisis de la abundancia ...," *op. cit.*, pp. 344 and 347.
241. Guitart, "Biología pesquera del emperador ...," *op. cit.*
242. S.A. Berkeley and E.D. Houde, "Swordfish, *Xiphias gladius*, dynamics in the Straits of Florida," *ICCAT Collected Volume of Scientific Reports* SCRS/80/40, Vol. XXXV (2), 1991, p. 377.
243. Govoni, Stender, and Pasuk, "Distribution of larval swordfish ...," *op. cit.*
244. Guitart, "Biología pesquera ...," *op. cit.* and Muñoz, Moreno, and Rodríguez, "Características bilógico-pesqueras ...," *op. cit.*.
245. Swordfish in the north Atlantic are part of a large Atlantic stock, although scientists continue to be unsure as to the precise nature of the population. Thus it is not correct to discuss swordfish or other highly migratory fish off any particular Caribbean island as a population in that many fish make annual migrations and are present for only a short time in any one area. Even so, the presence of resident fish has been noted and fishermen have noted that heavily areas may result in greatly reduced yields the following years, suggesting the presence of resident fish.
246. Moreno y Pol, "Contribución al estudio ...," *op. cit.*, p. 196.
247. Guitart, "Biología pesquera del emperador ...," *op. cit.* and Muñoz, Moreno, Rodríguez, and Pol, "Características bilógico-pesqueras ...," *op. cit.*, pp. 47 and 55.

248. Espinosa, Sosa, Moreno, and Quevedo, "Aspectos biológicos ...," *op. cit.*, p. 270 and Guitart, "Biología pesquera del emperador ...," *op. cit.*.
249. Muñoz, Moreno, Rodríguez, and Pol, "Características bilógico-pesqueras ...," *op. cit.*, p.45.
250. Muñoz, Moreno, Rodríguez, and Pol, "Características biológico-pesqueras ...," *op. cit.*, p. 47.
251. Rodríguez, Muñoz, Frias, Moreno, and Pol, "Caracteristicas del emperador ...," *op. cit.*, p. 167. This is the last known Cuban report the authors have noted with sampling data from the swordfish fishery.
252. The early larval sampling was done by Donald deSylva. Ault, *op. cit.*, March 30, 2000.
253. Rodríguez, Nieto, and Muñoz, "Analisis de la abundancia ...," *op. cit.*, pp. 342 and 348.
254. Rodríguez, Nieto, and Muñoz, "Analisis de la abundancia ...," *op. cit.*, pp. 342-343 and 349.

SECTION III. (Grounds)

255. E.C. Carrillo and J. Contreras, "Cuba and its marine environments," *Rev. Cub. Inv. Pesq*, 1998, Vol. 22, No. 1, pp. 61-68.
256. Carrillo and Contreras, "Cuba and its marine environments," *op. cit.*
257. Matthias Tomczak and J. Stuart Godfrey, *Regional Oceanography: An Introduction* (London: Pergamon, 1994), p. 311.
258. For details on the Brazil Current, see the Brazilian chapter of this report.
259. Tomczak and Godfrey, *Regional Oceanography, op. cit.*, p. 310-315.
260. Carrillo and Contreras, "Cuba and its marine environments," *op. cit.*, p. 68 and C. García, "Temperatura de las aguas oceanicas de Cuba: I. Aguas superficiales," *Rev. Cub Inv. Pesq.*, Vol. 6, No. 2, 1981, pp. 1-15. The subject of temperature and the distribution of swordfish is addressed in Guitart, "Biologia pesquera del emperador ...," pp. 21-24.
261. The current running west along the northern coast of Cuba and the other islands of the greater Antilles is usually referred to as the Antillian Current. The authors have noted, however, that it is occasionally referred to, at least in the westerly area between Cuba and the Bahamas, as the Bahamas Current (figure 15).
262. Fiedler, Lobell, and Lucas, "The fisheries ...," *op. cit.*, p. 92.
263. Rodríguez, *op. cit.*, September 16, 2001.
264. Rodríguez, *op. cit.*, September 13, 2001.
265. Cuban fishery biologists stress that there are significant differences between an insular and a continental shelf. Claro, Baisre, and Garcia-Arteaga, "Management of fishery resources," *op. cit.*
266. Cuban fishermen to not set in the Yucatan Channel as they have reported the current is too strong. Rodríguez, *op. cit.*, September 13, 2001.
267. A. Pérez, *op. cit.*, August 28, 2001.
268. One of the assessments of this fishery is A. Rodríguez and S. Moreno, "Características pesqueras y perspectivas de los palangres en Cuba," *Boletín Tecnico*, No. 1 (CIP: Havana, 1982), 22p.
269. Muñoz, Moreno, Rodríguez, and Pol, "Características biológico-pesqueras ...," *op. cit.*, p. 52 and Moreno, Pol, and Muñoz, "Influencia de la luna ...," *op. cit.*, p. 509.
270. A. Olaechea, "Ordenamiento de las pesquerías de peces de pico con palangre de superficie en aguas oceánicas alrededor de Cuba," Tesis para la aspirantura Dr. en Ciencias, (CIP: Havana, 1985) as cited in Espinoza, Sosa, Moreno, and Quevedo, "Aspectos biologícos ...," *op. cit.*, p. 267.
271. Vince Pyle, Fisherman's Best, personal communications, November 29, 2000 and Rodríguez, *op. cit.*, September 13, 2001.
272. The authors have noted, however, occasional references to the fishery in various general reports on Cuban fisheries, including one 2001 report. Claro, Baisre, and Garcia-Arteaga, "Management of fishery resources," *op. cit.*
273. Rodríguez, *op. cit.*, September 16, 2001.
274. Rodríguez, "Una revision ...," *op. cit.*, p. 465.
275. Claro, Baisre, and Garcia-Arteaga, "Management of fishery resources," *op. cit.*
276. Jorge Pol and Sonia Moreno, "Los palangres en la Flota del Golfo," *Mar y Pesca*, 1986, no. 252, pp. 32-35.
277. Two swordfish taken were taken, one off the northern and one off the southern coast, both were taken on hooks set about 50 meters. NMFS Southeast Fisheries Science Center, "NOAA ship *Oregon II* cruise ...," *op. cit.*
278. Claro, Baisre, and Garcia-Arteaga, "Management of fishery resources," *op. cit.*
279. Rodríguez, *op. cit.*, September 13, 2001.
280. Rodríguez, "Una revision ...," *op. cit.*, p. 465.
281. Rodríguez, "Una revisión ...", *op. cit.*, p. 466.

282. "Distant water tuna fishing developed by Cuba," *Bohemia*, January 18, 1994, pp. 22-29. The Cubans were able to drawn on test fishing conducted by the Soviets, some of it in cooperation with Cuban researchers. Zharov, "Resultado de los trabajos ...," *op. cit.*, pp. 53-62 and Sokolov, "Investigaciones sobre el atún ..., *op. cit.*, pp. 63-79.
283. Details on this work can be found in "Research" and "International: Foreign aid."
284. Rodríguez, *op. cit.*, September 13, 2001.
285. Rene J. Buesa, "Fishing zones for Cuban tuna vessels," unpublished CIP report, September 11, 1962.
286. Rodríguez, *op. cit.*, September 16, 2001.
287. The FAO and ICCAT data sets use 5°N for their statistical areas rather than the equator.
288. Garcia Morena and A. Rodriguez, "Cuban tuna fisheries in the Atlantic Ocean and research activities carried out in 1981 and 1982," *ICCAT Report for Biennial Period, 1982-83* (Part I 1982), (ICCAT: Madrid, 1983), pp. 233-236.
289. Buesa, "Fishing zones ...," *op. cit.*
290. Rodríguez, "Aspectos comparativos ...," *op. cit.* Dr. Rodríguez has briefed the authors on his work, but unfortunately, we were unable to obtain a copy of this important work in time to include in this report.
291. S. Valle and A. Rodríguez, "Intensidad total de pesquería con palangre de Cuba para el atún aleta amarilla (*Thunnus albacares*) en el Oceano Atlántico, 1973-1977," *Collective Volume of Scientific Papers* Vol. IX, 1979, (SCRS/79/30), pp. 46-49.
292. "Cuba accuses Morocco of 'brutal' attack on ships," *New York Times*, July 15, 1980.
293. Rodríguez, Nieto, and Muñoz, "Análisis de la abundancia ...," *op. cit.*, pp. 339-349.
294. Valle and Rodríguez, "Intensidad total ...," *op. cit.*, pp. 46-49.
295. Some of the earliest test fishing with longlines was done by a series of expeditions by the Soviet SRT-R 9006 *Olekma* which had been rigged with a longline. The research was conducted during the early 1960s. V.L. Zharov, "Resultado de los trabajos de búsqueda de la IV expedición atunera al Atlántico tropical," *Instituto Nacional de la Pesca Contribuciones/Investigaciones Atuneras Cubano-Soviéticas*, No. 25 (INP/CIP: Havana, 1967), pp. 53-62 and V.A. Sokolov, "Investigaciones sobre el atún en el golfo de Mexico y el Mar Caribe," *Instituto Nacional de la Pesca Contribuciones/Investigaciones Atuneras Cubano-Soviéticas*, No. 26 (INP/CIP: Havana, 1967), pp. 63-80.
296. Cuban Caribbean operations are discussed in more detail in the Caribbean overview.
297. S. Singh-Renton and R. Mahon, "Catch, effort, and CPUE trends for offshore pelagic fisheries in an adjacent to the exclusive economic zones (eezs) of several CARICOM states," *CARICOM Fisheries Report*, No. 1 (CARICOM: Belize City, Belize, 1996), p. 6.
298. Rodríguez, *op. cit.*, September 16, 2001.
299. For details on Cuban fishery activities in Latin America, see Tracey Thomas and Dennis Weidner, "Cuban fishery relations in the Americas, 1959-88," *International Fishery Reports*, (IFR-88/59), June 29, 1988.
300. Rodríguez, Nieto, and Muñoz, "Análisis de la abundancia ...," *op. cit.*, p. 340.
301. It would also been a hugely complicated matter. Some African countries have relatively small EEZs. Cuban longline sets were normally about 80 kilometers, but could be longer. This would involve areas in different countries. Rodríguez, *op. cit.*, September 13, 2001.
302. Rodríguez, *op. cit.*, September 23, 2001.
303. Taiwan operations occurred in the 1990s. Cuban sources indicate that there were no such relations with Taiwan earlier.
304. Cuban sources report their was formal arrangements with some U.S. fishermen, but the authors have not details on this.

SECTION IV. (Fleet)

305. Fernandez Cuervo, *op. cit.*, February 23, 1982.
306. U.S. and other foreign readers will wonder why a Government would continue such unprofitable operations for over 3 decades. Several factors are at play here. A major factor was that the Cubans managed to convince the Soviets to finance a large portion of the cost. Also the distant-water fleet served a variety of purposes beyond a economic profit and loss equation. Some of these factors are discussed in "I.B.2. New fisheries policy". Perhaps most important was that once the longliners were purchased, it was decided to operate them even though they were not profitable. FLOCUBA officials did not want to admit that they ad made a serious error and squandered millions of dollars in scarce foreign exchange. Besides in Cuba no one really knew how much anything really cost so the actual losses were not readily apparent and in fact probably never really calculated. As long as the Soviets were willing to subsidize fleet operations with fuel deliveries, FLOCUBA and FAC were willing to continue operations.

307. Luis Ubeda, "De cómo nace una flotilla cerquera," *Mar y Pesca,* December 1973, pp. 22-27.
308. "Peru builder loses tuna seiner orders," *Fishing News International*, October 1976, p.41.
309. Details on the development of Cuba's fishing fleet are reviewed in the Overview of this report.
310. Weidner and Hall, "Cuba," *op. cit.,* (appendix C), pp. 134-135.
311. Weidner and Hall, "Cuba," *op. cit.*, (appendices A and B), p. 133.
312. Weidner and Hall, "Latin America," *op. cit*, pp. 54-59 (appendix B3b1-2).
313. Two other countries which developed large fleets were Honduras and Panama, but these were not composed of domestic vessels, but rather foreign-owned flag-of convenience vessels. Weidner and Hall, "Latin America," *op. cit.*, (Latin America, appendix B2a1-2), p. 51.
314. Suárez Caabro, *Cuba y su Pesca*, *op. cit.*, p. 59.
315. Rodríguez, *op. cit.*, September 13, 2001.
316. The Anchoa-class longliners were built in the Euskalduna and Navy (various affiliates) shipyards at Vigo. Apparently 20 of these longliners were built in 1965-67, but the authors have also noted references to 26.
317. Achurra Larrain, "Los antecedentes ...," *op. cit.*, p. 93.
318. The evolution of the Cuban fleet and the difficulties encountered are covered in more detail in the Overview section.
319. Weidner and Hall, "Cuba", appendix C, pp. 134-135.
320. García Alvarez, *op. cit.*, November 24, 2000.
321. Inchcup, *op. cit.*, June 9, 2000.
322. Baisre, *op. cit.*, October 9, 2000.
323. "Peru builder loses looses tuna purse seine orders," *Fishing News International*, October 1976.
324. Fernandez Cuervo, *op. cit.*, February 23, 1982.
325. Arata, "A contribution to the life history ..., " *op. cit.*, pp. 188 and 234.
326. Hector E. Ramis Ramos, "Mejoras en el mantenimiento de la carnada viva para la pesca de tunidos en Cuba," *Notas Sobre Investigaciones*, No. 5, October, 1962, 11 p.
327. Buesa, "Fishing zones for Cuban tuna vessels," *op. cit.*, p. 9.
328. Ubeda, "But ... why does Cuba have a tuna fishing fleet," *Mar y Pesca*, No. 100, January 1974, NMFS Language Services Translation.
329. Buesa, "Fishing zones ...," *op. cit.*
330. Cuban sources interchangeably use FLOCUBA and FCP as an acronym for Flota Cubana de Pesca.
331. FAO, "Mejora e incremento ...," *op. cit.*, p. 1.
332. The Spanish provided assistance with purseseining and the Soviets with trawling, but it was primarily the Japanese that trained Cuban longline fishermen. Rodríguez, *op. cit.*, September 16, 2001.
333. Achurra Larrain, "Los antecedentes ...," *op. cit.*, p. 93.
334. "Tuna fishing in distant seas," *Bohemia*, January 18, 1974, pp. 22-29.
335. Caabro, *El Fracaso de FLOCUBA*, *op. cit.*, p. 61 and V.A. Sokolov y Hector Ramis Ramos, "Distribución de los atunes en el Atlántico occidental y central," *Contribuciones: Instituto Nacional de la Pesca Cuba/Centro de Investigaciones Pesqueras,* (Investigaciones Atuneras Cubano-Soviéticas), October, 1967, Nos. 23-26, combined issue, p. 34.
336. Zharov, "Resultado de los trabajos," *op. cit.*, pp. 53-62.
337. Suárez Caabro, *El Fracaso de FLOCUBA*, *op. cit.*, pp. 27-28.
338. Sokolov, "Investigaciones sobre el atún ...," *op. cit.,* pp. 63-80.
339. "Tuna fishing in distant sea," *Bohemia*, January 18, 1974, pp. 22-29.
340. Ubeda, "But ... why ...," *op. cit.*
341. *Mar y Pesca*, July 1979.
342. Julio A. Baisre, "La pesca en Cuba: Apuntes para su historia (VI. La pesca de altura),", *Mar y Pesca*, December 1987, number 267, pp. 30-37.
343. Achurra Larrain, "Los antecedentes ..., *op. cit.,* p. 93. Other reports indicate that Cuban began reducing the number of foreign advisers by 1965. "Distant water tuna fleet developed by Cuba," *Bohemia*, January 18, 1974.
344. U.S. Department of State, "Japanese fishermen in Cuba," message CA-8685, February 20, 1966.
345. Suárez Caabro, *El Fracaso de FLOCUBA*, *op. cit.*, p. 28.
346. Achurra Larrain, "Los antecedentes ..., *op. cit.,* p. 97.
347. The authors do not have time-line data on shark bycatches, but note even by the 1980s the reported shark bycatch was nearly 20 percent (appendix C4b), nearly four times the amount anticipated.
348. Ubeda, "But ... why ...," *op. cit.*
349. Ubeda, "But ... why ...," *op. cit.*

350. "Tuna fishing in distant seas," *Bohemia*, January 18, 1974, pp. 22-29.
351. Ubeda, "But ... why ...," *op. cit.*
352. "Peru builder loses tuna purse seiner orders," *Fishing News International*, October 1976, p. 41.
353. Ubeda, "But ... why ...," *op. cit.*
354. Abascal López, "Development of fishing industry surveyed," *op. cit*, pp. 9-18. Other sources date FAC's creation to 1974.
355. "Tuna fishing in distant seas," *Bohemia*, January 18, 1974, pp. 22-29.
356. "Peru builder loses tuna purse seiner orders," *Fishing News International*, October 1976, p. 41.
357. "Fishing boats for Cuba," PRELA 1447 GMT, April 28, 1976.
358. The Pisca Shipyard was left with 16 seiners in varying stages of construction and no buyers. "Peru builder loses tuna purse seiner orders," *Fishing News International*, October 1976, p. 41.
359. Ubeda, "But ... why ..., " *op. cit.*
360. Some herring and mackerel canning was also planned. U.S. Interests Section, Havana, "Cuban fishing vessel purchases," message number 30005, September 27, 1978 and U.S. Interests Section, Havana, "Cuban fishing vessel purchases," message number 3223, October 16, 1978.
361. Richard J. Berry, "Trip report--UNDP review in Cuba, October 10-12, 1978," NMFS memorandum, January 9, 1979. It is not clear to the authors what characteristics of the seiners being considered would avoid the problems presented by the clear water.
362. Fernando Davalos, "Tuna catch goal exceeded," *Granma*, November 22, 1979, p. 1.
363. Enrique Oltuski, Vice Fisheries Minister, personal communications, November 1980.
364. Morena and Rodriguez, "Cuban tuna fisheries ...," *op. cit.*, p. 233.
365. Fernandez Cuervo, *op. cit.*, February 23, 1982.
366. "Tuna fishing off Cuba," *Juventud Rebelde*, March 3, 1982 [translation].
367. The authors have relatively little information on these vessels, but one Cuban researcher mentions them in his excellent review of the Cuban tuna fishery in Cuban waters. Rodriguez, "Una revision ..." *op. cit.,* p. 466.
368. Rodríguez, *op. cit.*, September 13, 2001.
369. García Moreno, "National report of Cuba," *ICCAT Report* Part II, 1984-85 (ICCAT: Madrid, Spain, 1986), p. 245.
370. ICCAT, "Secretariat report on statistics and coordination of research," COM-SCRS/90/10 (Amended) *ICCAT Report*, 1990-91, Part I (ICCAT: Madrid, Spain, 1991), p. 26.
371. Julio Baisre, Director of Fisheries Management, Ministerio de la Industria Pesquera, personal communications, October 9, 2000.
372. José A. Suárez Caabro, "El sector pesquero en una Cuba libre," in *Desarrollo Agrícola de Cuba* (Colegio de Ing. Agr. y Azucareros de Cuba: Miami, 1992), pp. 257-278.
373. Baisre, *op. cit.*, October 9, 2000.
374. "Chinese delegation visits Cuba," FIS website, http://www.fis-net.com/fis/hotnews/", posted September 4, 1998.
375. Inchcup, *op. cit.*, June 9, 2000.
376. See the Overview section of this report.
377. Baisre, *op. cit.*, October 9, 2000.
378. The term "motopesquero" is used countless times in *Mar y Pesca* and other Cuban publications. An example is "Ahorro, productividad y emulación en la FAC," *Mar y Pesca*, September 1976, p. 4. In this case one of the vessels is identified as a longliner. In many other instances there is no reference to the vessel type.
379. Guitart, "Biologia pesquera del emperador ...," *op. cit.,* p. 26.
380. Guitart, "Biologia pesquera del emperador ...," *op. cit.,* p. 33.
381. Moreno, Pol, and Muñoz, "Influencia de la luna ...," p. 509-510. The authors in the text suggest an autonomy of 10-15 days, some what higher than the estimate in table 1 included in the same article.
382. Cuban authors in 2001 described both pelagic and demersal operations, including pelagic longlining for large pelagics off the northwestern coast in a soon to be published report. They indicate, however, that the fishery increasingly is focusing on sharks. One other important trend concerning the Cuban fleet is that it has been significantly reduced in recent years. The fleet operating on the Cuban shelf has been reduced from 1,850 boats in 1988 to only 840 boats in 1998. Only a small fraction of course are involved in longlining. Claro, Baisre, and Garcia-Arteaga, "Management of fishery resources," *op. cit.* For details on fishing methods see "Fleet Operations and Gear".
383. By the same token, Soviet specialists often crewed the trawlers.
384. Kawaguchi, "Exploratory tuna longline fishing ...," *op. cit.*, p. 62.

385. José A. Suárez Caabro, *El Fracaso de FLOCUBA* (Suárez Caabro: Miami, 1994), pp. 27-28.
386. Ubeda, "Tuna fishing ...," *op. cit.*
387. See for example, Fisheries Minister Jorge Fernandez Cuervo, MIP, interview by a Cuban journalist, February 23, 1982, transcript provided the authors by the U.S. Interest Section, Havana, March 17, 1982
388. "Distant water tuna fishing developed by Cuba," *op. cit.*, January 18, 1974, pp. 22-29.
389. Ubeda, "Why ... why ...," *op. cit.*
390. Rawlings, "A report on the Cuban tuna fishery, *op. cit.*, p. 19.
391. José Suárez Caabro and Pedro Pablo Duarte Bello. "Biología pesquera del bonito (*Katsuwonus pelamis*) y la albacora (*Thunnus atlanticus)* en Cuba," *Serie de Estudios sobre trabajos de investigación: Instituto Cubano de Investigaciones Tecnológicas*, February, 1961, No. 15, 151p.
392. "Tuna fish in distant seas," *Bohemia*, January 18, 1994, p. 22. Language Services Translation (F43), p. 22.
393. Rawlings, "A report on the Cuban tuna fishery," *op. cit.*, pp. 10-12.
394. Rodríguez, *op. cit.*, September 16, 2001.
395. C.A. Carlos Martin, "Composición por especies de las capturas de tunidos con vara en Cuba," *ICCAT Collective Volume of Scientific Papers* (SCRS/91/61), Vol. XXXIX (1), pp. 39-45.
396. Rodríguez, "Una revisión ..., *op. cit.*, p. 462.
397. Suárez Caabro, *El Fracaso ..., op. cit.*, pp. 23-24.
398. C.A. Carles, A. Cárdenas, and R. Alpízar, "Mejores en el mantenimiento de la carnada viva para la pesquería de tunidos can vara en Cuba," *Revista Cubana de Investigaciones Pesquera*, 1991, Vol. 16, No. 3-4, pp. 40-48.
399. ICCAT, *Statistical Bulletin*, 1997, p. 104.
400. "Tuna fishing in distant seas," *Bohemia*, January 18, 1974, pp. 22-29.
401. "Chinese delegation visits Cuba," FIS website, http://www.fis-net.com/fis/hotnews/", posted September 4, 1998.
402. "Tuna fish in distant seas," *Bohemia*, January 18, 1974, p. 22. Language Services Division (F43), NMFS translation.
403. "Tuna fish in distant seas," *op. cit.*, p. 22.
404. "Tuna fish in distant seas," *op. cit.*, p. 22.
405. Suárez Caabro, *El Fracaso de FLOCUBA*, *op. cit.*, p. 61.
406. "Tuna fish in distant seas," *op. cit.*, p. 22.
407. Ubeda, "But ... why ...," *op. cit.*
408. Vicente Cubillas, "Alecrín: Una actitud heroica ante un acto piratesco," *Mar y Pesca*, November-December 1968, numbers 38-39, pp. 4-7.
409. "El *Alecrín* volverá a navegar," *Mar y Pesca*, October, 1987, p. 5-6.
410. Jorge Julio González, "Flota Atunera de Cuba 1978: La palabra cumplida," *Mar y Pesca*, July 1979, no. 164, p. 22.
411. Fernando Davalos, "Tuna catch goal exceeded," *Granma*, November 22, 1979, p. 1.
412. Ubeda, "But ... why ...," *op. cit.*
413. "Sobrecumple la FAC su plan trimestral," *Mar y Pesca* October 1980, number 181, p. 5.
414. Ubeda, "But ... why ...," *op. cit.*
415. Pedro Morales, "Transbordo en alta mar," *Mar y Pesca*, December 1977, pp. 18-19.
416. FAO, "Mejora y incremento ...," *op. cit.*, p. 9.
417. Ubeda, "But ... why ...," *op. cit.*
418. Ubeda, "But ... why ...," *op. cit.*
419. González, "Flota Atunera de Cuba ...," *op. cit.*, p. 20.
420. "Tuna fish in distant seas," *op. cit.*, p. 22.
421. "Tuna fish in distant seas," *op. cit.*, p. 22.
422. "Tuna fish in distant seas," *op. cit.*, p. 22.
423. Ubeda, "But ... why ...," *op. cit.*
424. Davalos, "Tuna catch goal exceeded," *op. cit.*, p. 1.
425. The Moroccan Air Force apparently launched an attack against two Cuban tankers. Morocco at the time was engaged in a guerrilla war in the Spanish Sahara. Cuba had recognized Polisario, the Spanish Sahara insurgent group, and was known to have been providing humanitarian assistance. Whether they were also providing military assistance is not known. Tom Burns, "Morocco blamed for attack on Cubans," *Washington Post*, July 15, 1980.
426. The authors do not know where the Cuban takers took on fuel. It is possible that they even got it at Soviet ports, which could explain why the tankers were north of the primary Cuban fishing grounds. We have not noted, however, any reference to this in the Cuban press. We do know that the tankers moved back and forth from

Havana, so they may have taken on the fuel in Havana after it was delivered by the Soviets. This would then leave unexplained why the Cuban tankers were so close to the Western Sahara coast. Perhaps they had called in Las Palmas for some reason, but it is unclear why they moved eastward toward the Western Sahara rather than south or southeast toward the Cuban fishing fleet.

427. "Fishing boats for Cuba," PRELA 1447 GMT, April 28, 1976.
428. Morales, "Transbordo en alta mar," *op. cit.*, p. 18.
429. Raymond Hainey, "Cuban trawler put in quarantine," *The Royal Gazettee*, October 28, 1998.
430. Tim Greenfield, "Inchcup blasts 'humiliating' treatment of Cuban fishermen," *The Royal Gazette,* November 5, 1998.
431. Tony Cordeiro, "What a whopper!," *The Royal Gazette*, January 7, 1999.
432. Neil Inchcup, personal communications, June 9, 2000. For more details on the operations off Bermuda, see the Bermuda section of this report.
433. Joya Nelson, Marketing Manager, Seamont Fisheries, personal communications, October 30, 2000. For further details, see the Bermuda chapter of this report.
434. "Ahorro, productividad y emulación en la FAC," *Mar y Pesca*, September, 1976, p. 4.
435. FAO, "Mejora y incremento ...," *op. cit.*, p. 9.
436. González, "Flota Atunera de Cuba ...," *op. cit.*, p. 20.
437. "Ahorro, productividad y emulación en la FAC," *Mar y Pesca*, September, 1976, p. 4.
438. "Sobrecumple la FAC ...," *op. cit.*, p.5.
439. González, "Flota Atunera de Cuba ...," *op. cit.*, p. 20.
440. "Nueva hazaña del M/P Mero," *Mar y Pesca*, August 1989, p. 31.
441. Burns, "Morocco blamed ...," *op. cit.*
442. "Fishing boats for Cuba," PRELA 1447 GMT, April 28, 1976.
443. Davalos, "Tuna catch goal exceeded," *op. cit.*, p. 1.
444. "Cumplió la FAC su plan de captura del año," *Mar y Pesca*, December 1987, p. 3.
445. Moreno and Rodriguez, "Cuban tuna fisheries ...," *op. cit.*, p. 235.
446. "Tuna fishing off Cuba,"*Juventud Rebelde*, March 3, 1982, p. 1.
447. "Cumplió la FAC su plan de captura del año," *Mar y Pesca*, December 1987, p. 3.
448. FAO, "Mejora y incremento ...," *op. cit.*, p. 9.
449. Davalos, "Tuna catch goal exceeded," *op. cit.*, p. 1.
450. "Sobrecumple la FAC ...," *op. cit.*, p.5.
451. FAO, "Mejora y incremento ...," *op. cit.*, p. 9.
452. "Cumplió la FAC su plan de captura del año," *Mar y Pesca*, December 1987, p. 3.
453. González, "Flota Atunera de Cuba ...," *op. cit.*, p. 20.
454. "Cumplio la FAC al 104 por ciento su plan de junio," *Mar y Pesca*, September 1980, number 180.
455. Harold Ortiz Ríos, "Caballero del mar: Tuma a 16 años de su botadura," *Mar y Pesca*, June 1990, number 297, pp. 20-25.
456. FAO, "Mejora y incremento ...," *op. cit.*, p. 9.
457. Suárez Caabro cites conversations with Juan A. Pérez. Suárez Caabro, *El Fracaso de FLOCUBA, op. cit.*, p. 86.
458. The authors have observed bus loads of Russian and Ukrainian fishermen returning to their vessels at the New Zealand port of Lyttelton carrying bags full of purchases for resale at home.
459. Georgina Bustamante, personal communications, August 7, 2001.
460. Suárez Caabro, *El Fracaso de FLOCUBA,* op. cit., p. 87.
461. Kravanja, "Soviet and Cuban fisheries ...," *op. cit.,* p. 162.
462. Rodríguez, *op. cit.*, August 17, 2001.
463. Suárez Caabro, *El Fracaso de FLOCUBA,* op. cit., p. 87.
464. Suárez Caabro, *El Fracaso ..., op. cit.*, p. 85-86.
465. Ubeda, "Tuna fishing ...," *op. cit.*
466. Bustamante, *op. cit.*, August 7, 2001 and Rodríguez, *op. cit.*, September 13, 2001.
467. Joyce, "Spiny lobster ..., " *op. cit.*, pp. 492-493.
468. Bustamante, *op. cit.*, August 7, 2001.
469. A. Perez, *op. cit.*, August 28, 2001.
470. See for example, "Ahorro, productividad y emulación en la FAC," *Mar y Pesca*, September, 1976, p. 4.
471. "Vanguardias nacionales de la pesca en 1983," *Mar y Pesca*, April 1984, 223, p. 4.
472. See for example, "Sobrecumple la FAC su plan trimestrel," *Mae y Pesca*, October, 1980, number 181, p.5.

473. Anicia García Alvarez, Centro de Investigaciones de Economía Internacional, Universidad de la Habana, personal communications, November 24, 2000.
474. The overall number of FAC land employees and crew members was 1,800 in 1981-82. Ubeda, "Tuna fishing ...," *op. cit.*
475. The Party Congress is theoretically the ultimate authority of the Cuban Communist Party. In fact, decisions are made by President Castro and his closes advisers informally or officially through the 24-member Politburo. The Party Congress functions more to ratify Castro's decisions and explain them to the Party representatives so they can rally the Party faithful.
476. Jorge Julio Gonzalez and Luis Ubeda, "Al hablar con nuestros delegados directos," *Mar y Pesca* December, 1980, number 183.
477. "Legalidad socialista," *Mar y Pesca*, December 1989, number 291, p. 31.
478. The Instituto Nacional de Pesca is the former name of the Cuban fisheries agency which is now the Ministerio de la Industria Pesquera (MIP) before it was elevated to ministerial rank. This can be confusing as many early fisheries research publications include both the acronyms CIP and INP. In many other Latin American countries, the INP is the name of the primary government fisheries research group.
479. INP, *La Industria Pesquera en Cuba*, *op. cit.*, p. 26,
480. Richard Berry, "UNDP review in Cuba, October 10-22, 1978," NMFS trip report, January 9, 1979.
481. "Un encuentro inolvidable," *Mar y Pesca*, November, 1987, number 266, p. 5.
482. See for example the 1983 Vanguardias awards, "Vanguardias nacionales ...," *op. cit.*, p.4.
483. John Hotalig, NMFS, personal communications, November 6, 2000.
484. Problems on older vessels include the steel hull slowly wearing away and the stress from ocean operations gradually weaking the welds. James Mehan, NMFS, personal communications, September 18, 2001.
485. Rodríguez, *op. cit*, September 13, 2001.
486. Fernando Davalos, "Havana fishing port fulfills 1981 plan ahead of schedule," *Granma*, November 4, 1981.
487. The authors have noticed terrible examples of fleet maintenance in Argentina, Cuba, Mexico, Peru, Uruguay, and elsewhere in Latin America. Chile appears to be a notable exception in this regard.
488. The Cuban press increasingly reported on efforts to reduce maintenance costs. See for example, "Pescadores de la FAC producen más de un millón de pesos en divisas," *Mar y Pesca*, March 1978, p. 3. In countries with a controlled state-run media, this is a good indicator that there are maintenance problems.
489. Rodríguez, *op. cit.*, September 16, 2001.
490. González, "Flota Atunera de Cuba ...," *op. cit.*, pp. 20-22.
491. Ubeda, "Tuna fishing ...," *op. cit.*
492. "Cuba: Record en la pesca de tunidos," *Industrias Pesqueras*, April 15, 1989, p. 123.
493. Hainey, "Cuban trawler put in quarantine," *op. cit.*, p. 1.
494. Suárez Caabro, *El Fracaso de FLOCUBA*, *op. cit.*, p. 17.
495. Puente, *op. cit.*, November 10, 2000.

SECTION V. (Shipyards)

496. Pedro Morales, "La industria de astilleros: Obra plena de la Revolución," *Mar y Pesca*, March 1984, number 222, pp. 9-10.
497. Morales, "La industrial de astilleros ...," *op. cit.*, p. 8.
498. Cuba acquired some expensive, relatively large shrimp trawlers in France, using scarce foreign currency reserves. The vessels were to be used off the coasts of other countries. The proliferation of 200-mile coastal zones in the late 1970s, however, made it impossible for Cuba to deploy the vessels. It was thus decided to convert them to tuna baitboats. "Tuna fishing off Cuba,"*Juventud Rebelde*, March 3, 1982, p. 1.
499. Ubeda, "Tuna fishing ...," *op. cit.*
500. "A presión: Ensayo gráfico," *Mar y Pesca*, April 1990, número 295, pp. 26-27.
501. Good but dated review of the Cuban fishing vessel construction program is available in Morales, " La industria de astilleros ...," *op. cit.*, pp. 8-11. Another helpful overview is Pedro Morales, "Pasos indispensables en el desarrollo," *Mar y Pesca*, April 1984, number 223, pp. 8-11.
502. CUBAMAR, "Fishing boats," internet posting accessed October 31, 2000: http://www2.cubamar.cu/argus/english/pesca.htm
503. Abascal López, "Development of fishing industry surveyed," *op. cit.*, pp. 9-18.
504. Jesus Abascal López, "Our catch will total 200,000 tons," *Mar y Pesca*, October, 1977, pp. 9-18.

505. CUBAMAR, "La Pesca," internet posting accessed October 31, 2000: http://www2.cubamar.cu/anpp/lapesca.htm
506. Jesus Abascal, "Cuba y la pesca: 10 años de revolución," *Mar y Pesca*, November-December 1989, number 38-39, *op. cit.*, p. 12.
507. Sixto Rodríguez, "Hablemos del enmallado: Tras la huella del ferrocemento," *Mar y Pesca*, December 1980, number 183, pp. 14-19.
508. Much of the La Coloma shipbuilding facility, for example, was paralyzed in 1989 by the lack of wheels for the cradles in which the ships are built. Although the wheels are manufactured in Mua, a town adjacent to Guantanamo, logistical problems apparently kept the yard from obtaining the needed parts. Luis Obeda, "Largo fue el camino," *Mar y Pesca*, July 1989, pp.24-27.
509. Rodríguez, *op. cit.*, September 13, 2001.
510. James Mehan, NMFS, personal communications, September 18, 2001.
511. Cubamar, "Argus-Astilleros," internet posting accessed December 28, 1999: http://www.cubamar.cu/argus/iastille.htm
512. Rodríguez, *op. cit,* September 13, 2001.
513. Cubamar, "Cuba y su industria pesquera," internet posting accessed December 28, 1999: http://www.cubamar.cu/pesca/pesca.htm
514. Cubamar, "Argus-Avos," internet posting accessed December 28, 1999: http://www.cubamar.cu/argus/iavos.htm
515. Repair facilities include at least three Soviet-built floating docks as well as substantial on-shore facilities. "Dique flotante al puerto de la Habana," *El Nuevo Dia*, June 1, 1989; Fernando G. Davalos, "Arribo a la Habana, arrastada por el remolcador soviético '*Poseidón*,' la sección principal de un nuevo dique flotante para la pesca." *Granma*, February 6, 1974.
516. Harold Ortíz Ríos, "Van a pique los incumplimientos: Puerto Pesquero de Habana," *Mar y Pesca*, April 1988, number 271, pp. 34-37.
517. Artisanal yards were granted $15 million in government credits in 1984. "Créditos a pescadores," *Mercurio*, January 1984.
518. Cubamar, "Argus-Astilleros," internet posting accessed December 28, 1999: http://www.cubamar.cu/argus/iastille.htm
519. Cubamar, "Argus-Asticar," internet posting accessed December 28, 1999: http://www.cubamar.cu/argus/iasticar.htm
520. "First shrimp trawling fishing boat launched," *Cuban Economic News,* November 24, 1998.
521. Dennis Delgado García, "Chispas: Ensayo Gráfico," *Mar y Pesca*, January 1990, numbcr 292, pp. 38-39 and CUBAMAR, "Docking capabilities," internet posting accessed October 31, 2000: http://www2.cubamar.cu/argus/english/varada.htm
522. Ubeda, "Tuna fishing ...," *op. cit.*
523. For details see Weidner and Hall, "Cuba," *op. cit.*, pp.120-122.
524. CUBAMAR, "We can do business on ...,"internet posting accessed October 31, 2000: http://www2.cubamar.cu/argus/english/negociar/htm

SECTION VI. (Fleet Operations and Gear)

525. Artisanal or small-scale fishermen are on many Caribbean islands referred to as commercial fishermen because the fishing industry is a relatively modest undertaking and there are no large-scale commercial fisheries.
526. A Canadian researcher reports that a few small-scale fishermen were allowed to continue operations with their own boats. Few details, however, are available. Joyce, *op. cit.*, November 27, 2000.
527. The Revolutionary Government's early fishery policies are discussed in more detail in "Overview: B2. New fisheries policy".
528. One Cuban source during the 1980s mention light attraction and described it in another article as a kerosene lamp on a surface buoy used to attract fodder fish. Pol and Moreno, "Los palangreros ...," *op. cit.*, p. 37 and Moreno, Pol, and Muñoz, "Influencia de la luna ...," p. 509-510. This of course differs from the light sticks employed by U.S. commercial longline fishermen below the surface near the hooks. The authors have noted no indication that Cuban fishermen use light sticks. There are no Cuban companies manufacturing light sticks. MIPES does not appear to have imported light sticks for the artisanal fishermen. Foreign exchange is perennially in short supply and MIPES does not generally promote imported gear and equipment for artisanal fishermen.
529. Pol and Moreno, "Los palangres ...," *op. cit.*, p. 37.

530. Jorge Pol and Sonia Moreno, "Los palangres en la Flota del Golfo," *Mar y Pesca*, 1986, no. 252, pp. 32-37.
531. The number of press reports at least suggested more illegal fishing during the 1990s than in previous years. Cuba sources, however, indicate that substantial progress has been made in solving the problem. Claro, Baisre, and Garcia-Arteaga, "Management of fishery resources," *op. cit.*
532. Marvin Hernández Monzón, "Concluyó otro año de ofensiva contra los pescadores cubanos," *CubaNet,* January 20, 2000. Articles like this should be put into perspective. Most countries have a variety of laws and regulations which limit the access of fishermen to the resource. Many fishermen in the United States, Canada, and Wester Europe have precisely the same view about management actions by the national fisheries agency.
533. The authors at this time have no detailed reports conforming the seizures of boats operated by the fishing associations and if so just what penalties, if any, were taken against the association.
534. Joyce, "Socialism and the fishery ...," *op. cit.*, p. 64.
535. A. Pérez, *op. cit.*, August 28, 2001.
536. Anonymous, personal communications, March 16, 2000.
537. Vicente Escobal, "Implantan normas para pesca deportiva," *CubaNet*, January 24, 2000.
538. S. Kip Farrington, Jr., "Spearfish of the world," in Brian Vesey-Fitzgerald and Francesca LaMonte, (eds.) *Game Fish of the World* (Harper & Brothers: New York, 1949), p. 153.
539. A 1940s account indicated the fishermen were using skiffs or round bottom sail-powered, 4.5-5.5 m long. Only a few boats were motorized. Martinez, "The Cuban fishing industry," *op. cit.*, p. 5.
540. Farrington, "Spearfish of the world," *op. cit*, p. 153.
541. Martinez, "The Cuban fishing industry," *op. cit.*, p. 5.
542. Farrington, "Spearfish of the world," *op. cit.*, p. 153.
543. Mullet, barracuda, and king mackerel were also used.
544. Farrington, *op. cit.*, p. 153.
545. Farrington, "Spearfish of the world, *op. cit.*, p. 153.
546. A later 1960s account indicated that they targeted various oceanic pelagics, including marlin, tuna, and shark, but less commonly swordfish. FAO, "Mejora y incremento ...," *op. cit.*, p. 2.
547. Farrington, "Spearfish of the world," *op. cit.*, p. 153.
548. Farrington, "Spearfish of the world," *op. cit.*, p. 153.
549. Claro, Baisre, and Garcia-Arteaga, "Management of fishery resources," *op. cit.* Perhaps the best assessment of Cuban longline gear is A. Rodríguez and S. Moreno, "Características y perspectivas de los palangres en Cuba," *Boletín Técnico*, No. 1 (VIP: Havana, 1982), 22p. Unfortunately, the authors were unable to obtain a copy for this report.
550. A. Rodríguez Rodríguez and M. García Perez, "Los palangres de deriva cubanos," *ICCAT Collective Volume of Scientific Papers* (SCRS/83/44) Vol. XX (ICCAT: Madrid, 1984), pp. 519-520.
551. Rodríguez, *op. cit.*, September 13, 2001.
552. Dario J. Guitart Manday, "Biología pesquera de emperador o pez de espada, *Xiphias gladius* Linnaeus (Teleostomi: Xiphiidae) en las aguas de Cuba," *Poeyana*, Serie B, no. 1, Acad. Cienc. Cuba.
553. A. Rodríguez, "Una revision de las pesquerias de tunidos y afines en aguas Cubanas," *Collective Volume of Scientific Papers*, (SCRS/88/29) Vol. XXX (ICCAT: Madrid, 1989), p. 465.
554. F. LaMonte, "Note on breeding grounds of blue marlin and swordfish off Cuba," *Copeia*, December 26, 1944, p. 258.
555. One of the best descriptions of the Cuban artisanal swordfish fishery is Guitart's 1964 work. While the author does not provide any historical information, he does suggest that the artisanal fishery is a traditional fishery. Guitart-Manday, "Biologia pesquera del emperador ...," *op. cit.*, p. 1. Notably, Guitart does not cite any articles describing the artisanal longline fishery in the bibliography to his 1964 article. Guitart-Manday, "Biologia pesquera del emperador ...," *op. cit.*, p. 37. An excellent review of Cuban fisheries for tuna and related species refers to fisheries for large pelagics dating back to the late 19th century. Rodríguez, "Una revisión ...," *op. cit.*, P. 462. The authors could not find, however, a detailed description of the Cuban fishery for fisheries before 1940s.
556. It is unclear to the author just what occurred in 1959. It appears that there were swordfish catches earlier, but they were just not being reported. As mentioned above, Guitart, the primary source on the artisanal fishery, suggests in 1964 that the artisanal longline fishery was a "traditional" fishery, but is not clear as to just when the fishery began. Guitart's research was conducted in 1961-63 and he states that the fishery was conducted for 1 year, but it is not clear that this refers to how long the fishery had been conducted. Guitart-Manday, "Biologia pesquera del emperador ...," *op. cit.*, p. 1.
557. Rodríguez, "Una revisión ...," *op. cit.*, p. 465.

558. The author in his excellent survey of Cuban tuna fisheries uses the term "pescan establemente" which we take to mean regularly or routinely deployed longlines. Rodríguez, "Una revision ...," *op. cit.*, p. 464.
559. Rodríguez, "Una revisión ...," *op. cit.*, p. 466.
560. Rodríguez, "Una revisión ...," *op. cit.*, p. 466.
561. Rodríguez and García, "Los palangres de deriva Cubanos, *op. cit.*, pp. 519-520.
562. Cuban researchers advise that two particularly important articles with catch composition data are: A. Rodríguez, S. Moreno, and J. Pol, "Eficiencia pesquera de los palangres de deriva Cubanos," *Res. Pub. Actas de V Forum Científico del CIP* (CIP: Havana, 1986), p. 6 and J. Pol, L. Muñoz, S. Moreno, and A. Rodríguez, "Evolución de la abundancia de grandes pelágicos en la region noroccidental de Cuba," *Rev. Cub. Inv. Mar.*, Vol. 9, No. 1, 1990, pp. 41-49. While we were unable to obtain the first publication, we were able to obtain the second publication a fe days before finalizing this report. While we were unable to fully use the report, we did use the basic catch composition data supplied.
563. Olaechea, "Ordenamiento de las pesquerías ...," *op. cit.*
564. Dario Guitart Manday, "Las pesquerías pelágico-oceanicas de corto radio de acción en la region noroccidental de Cuba," *Serie Oceanológica*, No. 31, Academia de Ciencias de Cuba, 1975 p. 4. Details on the species composition of billfish and shark are included in "XV. Bycatch".
565. L. Espinosa, M. Sosa., S. Moreno, and R. Quevedo, "Aspectos biologicos de los peces de pico en la region noroccidental de Cuba," *ICCAT Collective Volume of Scientific Papers*, Vol. 28 SCRS/87/22 (Madrid: ICCAT, 1988), p. 275.
566. S. Moreno and J. Pol, "Contribution al estudio de las pesquerias con palangres de deriva en la region noroccidental de Cuba," *I Cong. Cienc. Cuba*, Havana 1985.
567. Olaechea, "Ordenamiento de las pesquerías ...," *op. cit.*
568. Moreno and Pol, "Contribución al estudio ...," *op. cit.*, p. 191.
569. Jorge Pol, Luis Muñoz, Sonia Moreno, and Andrés Rodríguez, "Evolución de la abundancia de grandes pelágicos en la región noroccidental de Cuba," *Revista de Investigaciones Marinas*, Vol. XI, No. 1, 1990, p. 45. While these estimates provide a basic assessment of the composition of the artisanal catch, there are important Cuban reports that the authors could not obtain that provide more detailed data. Perhaps the most important assessment of the longline catch composition off Cuba is work done by Andrés Rodríguez and his colleagues at the CIP. A summary is available in A. Rodríguez, S. Moreno, and J. Pol, "Eficiencia pesquera de los palangres de deriva Cubana," *Quinto Foro Cientifica del CIP* (Havana: CIP:, 1986), p. 8.
570. The project used five different vessels. Three were small (18-23 m) vessels like the ones used by the artisanal fishermen. One was a medium sized (37 m) vessel. The other was the *Bonito*, one of Cuba's large (55 m) distant-water longliners (appendix A5c). FAO, "Mejora e incremento ...," *op. cit.*. p. 12.
571. FAO, "Mejora e incremento ...," *op. cit.*. p. 9.
572. The best description of Cuban longline gear is Rodríguez, A. and S. Moreno. "Características pesqueras y perspectivas de los palangres en Cuba," *CIP/MIP Boletín Técnico* No. 1 (CIP: Havana, 1982). Unfortunately this report was not available to the authors. We have used a variety of other reports including a short synopsis of the above report with some updated statistics. Rodríguez and García, "Los palangres de deriva en Cuba," *op. cit.*, pp. 518-522. Another excellent source was Pol and Moreno, "Los palangres en la Flota del Golfo, *op. cit.*, pp. 32-37.
573. Moreno, Pol, and Muñoz, "Influencia de la luna ...," p. 509-510. This description of the gear comes primarily from the diagram on page 510.
574. Guitart, Juárez, and Milera, "Análisis de las pesquerías deportivas ...," *op. cit.*, pp. 138-140.
575. Moreno, Pol, and Muñoz, "Influencia de la luna ...," p. 509-510. This description of the gear comes primarily from the diagram on page 510.
576. Guitart, "Biologia pesquera del emperador ...," *op. cit.*, p. 27.
577. FAO, "Mejora y incremento ...," *op. cit.*, p. 2. One Cuban researcher reports that hake was never used as bait and believes that bonefish was not commonly used. Rodriguez, *op. cit.*, September 13, 2001.
578. Guitart Manday, "Las pesquerias pelágico-oceanicas ...," *op. cit.*, p. 9.
579. Guitart, "Biologia pesquera del emperador ...," *op. cit.*, pp. 26-33.
580. Moreno, Pol, and Muñoz, "Influencia de la luna ...," p. 509-510.
581. Guitart, "Biologia pesquera de emperador ...," pp. 32-33.
582. An important study describing the methods and gear of the commercial longline fishery was prepared by Andrés Rodríguez. Unfortunately, the authors could not obtain a copy for this report. A summary is available in A. Rodríguez, "Comparación de los tecnicos Japonesa y Cubana para el palangre larga de deriva," *Quinto Foro Cientifica del CIP* (Havana: CIP:, 1986), p. 16.
583. Rodríguez, "Una revisión ...," *op. cit.*, p. 465.

584. Cuba researcher Andrés Rodríguez informs the authors that he and in colleagues in 1986 did prepare a paper on the efficiency of the Cuban artisanal fishery which they delivered at the CIP V Forum Científico. Rodríguez, Moreno, and Pol, "Eficiencia pesquera ...," *op. cit.*, p. 8. Unfortunately, the authors have been unable to obtain a copy of the report. Other Cuban observers have noticed the lack of published papers on economic issues concerning the fishing industry. "... we encounter copious literature related to oceanography, marine biology, and fisheries, but there is little to be seen about the fundamental economy of the fishing industry." Suárez Caabro, *Cuba y Su Pesac*, *op. cit.*, p. xvii.
585. Rodríguez, "Una revision ...," *op. cit.*, p. 465.
586. This was in part because virtually all non-essential publication ceased in Cuba during the Special Period of the 1990s. Virtually all the paper used in Cuba is imported and such imports were drastically reduced in the early 1990s.
587. Rodriguez, *op. cit.*, September 16, 2001.
588. Elvira Carrillo, Programa Nacional de Tortugas Marinas, personal communications, February 29, 2000.
589. Baisre, *op. cit*, October 9, 2000.
590. Claro, Baisre, and Garcia-Arteaga, "Management of fishery resources," *op. cit.*
591. Artisanal longline fishermen during the 1980s reported that sharks made up about 40 percent of their catch, but that tuna catches were minor (appendix C4a).
592. Lt. Bentley, U.S. Coast Guard, personal communications, February 18, 2000.
593. LCR Dave Cinalli, Chief of Fisheries Enforcement, Division 7, U.S. Coast Guard, personal communications, February 15, 2000 and LCDR James Scheye, Division 7, U.S. Coast Guard, personal communications, February 18, 2000.
594. Pyle, *op. cit.*, November 29, 2000.
595. Anonymous source, personal communications, July 27, 2001. The source reports that he believes that this was a dollar store, although he was not positive.
596. Moreno and Pol, "Contribución al estudio ...," p. 191.
597. The authors do not have a complete history of Cuba's fishery cooperatives. After the 1959 Revolution they were no cooperatives in a true sense, but rather collective enterprises operating state-owned boats. One observer reports that by the early 1970s, most of the cooperatives had been organized into combinados pesqueros, although some retained the name "cooperativa". Joyce, *op. cit.*, November 27, 2000.
598. Anonymous, *op. cit.*, March 16, 2000.
599. A. Pérez and D. Rae, "Collapse ...," *op. cit.*
600. Anicia García Alvarez, Centro de Investigaciones de Economía Internacional, Universidad de la Habana, personal communications, November 24, 2000.
601. Anonymous, *op. cit.*, March 16, 2000.
602. Rodríguez, "Una revision ...," *op. cit.*, p. 464.
603. An excellent review of Cuba's pre-Revolutionary baitboat fishery is available in John E. Rawlings, "A report on the Cuban tuna fishery," *Commercial Fisheries Review,* January, 1953, Vol. 15, no. 1, pp. 8-21.
604. Suárez Caabro and Duarte Bello, "Biología pesquera del bonito ...," *op. cit.*, pp. 19-20.
605. Servando Valle and Félix Moncada y Hirtenfeld, "La pesca de atún en Cuba," *Panorama Atunero*, September-October 1987, pp. 26-28.
606. S.V. Valle Gómez, "Caracterización de los cardumenes de listado (*Katsuwonus pelamis*) y atún aleta negra (*Thunnus atlanticus*) en aguas de Cuba," *ICCAT Collective Volume of Scientific Papers* (SCRS/91/32), Vol. XXXIX (1), pp. 12-26.
607. Martin, "Composición por especies ...," *op. cit.*, pp. 43-44.
608. I. Palomera, "Datos sobre el desarrollo de la pesca del bonito en Cuba y su industrialización," *I Symp. Nat. de Cuba*, SRNCA, 3p.
609. Rodríguez, *op. cit.*, September 13, 2001.
610. For example see Fish Info Service, "Chinese delegation ...," *op. cit.*
611. The Cubans also never targeted albacore or made deepwater sets. Rodríguez, *op. cit.*, September 16, 2001. The minimal Cuban catch is reflected in their tuna catch data (appendix C9b). The authors do note a sizeable bigeye catch during the 1970s, but are unsure about the accuracy of the species identification. Bigeye and yellowfin are very hard to tell apart.
612. Spanish fishermen worked with the FCP and were present in 1974 during the early period of FAC's operations. Suárez Caabro, *El Fracaso de FLOCUBA*, *op. cit.*, p. 83 and Ubeda, "Why ... tuna ....," *op. cit.* They were especially important in assisting with purseseine operations.
613. FAO, "Mejora y incremento ...," *op. cit.*, p. 1.

614. ICCAT, "Report of the Standing Committee on Research and Statistics," *ICCAT Report* Part II, 1984-85 (ICCAT: Madrid, Spain, 1986), p. 105; B. García Moreno, "National report of Cuba," *ICCAT Report* Part I, 1986-87 (ICCAT: Madrid, Spain, 1986), pp. 267-268; and Rodríguez, Nieto, and Muñoz, "Analisis de la abundancia ...," *op. cit.*, pp. 339-349..
615. The authors are unsure as to the accuracy of the species identification. Cuban accounts of the fishery always focus on yellowfin.
616. Rodríguez, Nieto, and Muñoz, "Analisis de la abundancia ...," *op. cit.*, pp. 339-349.
617. ICCAT/FAO statistical discrepancies and different statistical areas make it difficult to assess the relative importance of the fishing areas.
618. Rodriguez, *op. cit.*, September 16, 2001.
619. Rodríguez, *op. cit.*, September 13, 2001.
620. Rodríguez, *op. cit.*, September 13, 2001.
621. "Tuna fishing in distant seas," *Bohemia*, January 18, 1974, pp. 22-29. Cuban publications often include claims by various economic enterprises that they are making great strides in increasing their efficiency. Undoubtedly some of these claims may be accurate. Given the extreme inefficiencies in the Cuban economy, however, many of these claims should be treated with considerable caution. Subsidized fuel from the Soviets, for example, meant that the Cuban fleet did not operate under the same financial constraints as many other distant-water longline fleets.
622. González, "Flota Atunera de Cuba ...," *op. cit.*, p. 20.
623. Burns, "Morocco blamed ...," *op. cit.*
624. Morales, "Transbordo en alta mar," *op. cit.*, pp. 18-19.
625. The authors have no current information on Cuban-Russian cooperation, but believe that even before the Soviet Union dissolved that the Soviets stopped providing fuel at sea, especially fuel at subsidized prices. Presumably at sea fleet cooperation ended about 1992-93, but the authors have no actual evidence to confirm this. We do note that Soviet trawlers by the early 1990s made far fewer calls at Havana for servicing. A few Russian trawlers called at Havana during 1992 and 1993, but none are known to have called after 1993. Anonymous Cuban sources, August 1, 2001.
626. FAO, "Mejora y incremento ...," *op. cit.*, p. 1. The Japanese served as fishing masters, but never as the vessel captains. Rodríguez, *op. cit.*, August 17, 2001.
627. Rodríguez, *op. cit.*, August 17, 2001.
628. Rodriguez, *op. cit.*, September 16, 2001.
629. A. Rodríguez and M. García, "Los palangres de deriva cubanos," *ICCAT Collected Volume of Scientific Papers* (SCRS/83/44), Vol. 20 No. 2 (ICCAT: Madrid, 1984), pp. 518-522.
630. "Distant water tuna fishing developed by Cuba," *Bohemia*, January 18, 1974, pp. 22-29 and Rodríguez, *op. cit.*, September 16, 2001.
631. Rodríguez, *op. cit.*, September 13, 2001.
632. Rodriguez, *op. cit.*, September 13, 2001.
633. Rodríguez, *op. cit.*, September 13, 2001.
634. The authors have posed this question to several former Cuban fishery researchers who worked with FAC. None could explain the lack of innovation. It seems the most likely reason is bureaucratic inertia and the nature of a state corporation in a closed society. See footnote 62.
635. Rodríguez, *op. cit.*, September 16, 2001.
636. Luis Muñoz, personal communications, August 14, 2001.
637. "Distant water tuna fishing developed by Cuba," *Bohemia*, January 18, 1974, pp. 22-29.
638. González, "1978: La palabra cumplida," *op. cit.*, p. 20.
639. Ubeda, "Tuna fishing ...," *op. cit.*, p. 9.
640. "Nueva hazaña del M/P Mero," *Mar y Pesca*, August, 1989, p. 31.
641. "Distant water tuna fishing developed by Cuba," *Bohemia*, January 18, 1994, pp. 22-29.
642. González, "Flota Atunera de Cuba ...," *op. cit.*, p. 20.
643. "Nueva hazaña del M/P Mero," *Granma*, August, 1989, p. 31.
644. Rodríguez, Nieto, and Muñoz, "Analisis de la abundancia ...," *op. cit.*, pp. 343 and 348.
645. "Más barcos palangreros para nuestra flota," *Mar y Pesca*, January 1967, p. 19.
646. Cuba had 26 commercial longliners in 1968-69, most large commercial longliners of the 55-m Anchoa class (appendix A4c). Given the tuna catch reported, these vessels were averaging only about 100 t annually--far below the anticipated catch.
647. Achurra Larrain, "Los antecedentes ...," *op. cit.*, pp. 93-97.

648. The authors have chosen the eastern Atlantic (appendix C7a) because distant-water longlining was the principal fishery the Cubans conducted there. Data for the western Atlantic mixes in the coastal fishery. Even in the easter Atlantic, however, the data is not a clean look at longline results as for much of the period, FAC also deployed a medium sized purseseiner. The authors also believe that a very substantial part of the tuna reported as bigeye was actually yellowfin.
649. The authors are, however, unsure just what vessels were used to take these large quantities of jacks.Cuba mostly deployed longliners in the eastern central Atlantic. It is possible some other vessels were deployed for brief periods. A Cuban researcher believes thus may be an error in reporting, perhaps confused with the purseseine fishery. Rodríguez, *op. ct.*, September 16, 2001.
650. Rodríguez, Nieto, and Muñoz, "Analisis de la abundancia ...," *op. cit.*, p. 347.
651. The catch composition data reported in 1966-70 (appendix C4b1a) provides a more realistic look at actual results, but such detailed data is not available for subsequent years.
652. U.S. Interests Section, Havana, "Cuban fishing vessel purchases," message number 30005, September 27, 1978 and U.S. Interests Section, Havana, "Cuban fishing vessel purchases," message number 3223, October 16, 1978.
653. Rodríguez, Nieto, and Castro, "Aspectos comparativos ...," *op. cit.*, p. 175.
654. FAC reported that 24 percent of the tuna catch was swordfish. "Cumplio la FAC su plan de captura del año," *Mar y Pesca*, December 1987, p. 3. The authors are unsure how to interpret this. FAC was apparently using the term tunas ("tunidos") to be the entire catch of tuna, billfish, and swordfish. We're not sure if other species were included in the FAC computation.
655. This is further confirmed by assessing the catches in area 34 reported by FAO. The data show wide variations in the proportion of swordfish from year to year during the 1980s, but average out to 13 percent (appendix C7a).
656. Rodríguez, *op. cit.*, September 16, 2001.
657. Inchcup, *op. cit.*, June 9, 2000.
658. "Nueva hazaña del M/P Mero," *Mar y Pesca*, August, 1989, p. 31.
659. CARIBEX, "Otros," *op. cit.*
660. Rodríguez, *op. cit.*, September 16, 2001.
661. Rodríguez, *op. cit.*, September 30, 2001.
662. Rodríguez, *op. cit.*, October 2 and 8, 2001.
663. Rodríguez, *op. cit.*, September 13, 2001.
664. This is normal press treatment in a country with a controlled press. Problems are usually not widely reported are even acknowledged. The only indication that problems exist is when the press begins to report that they are being resolved. Often the reports as to solutions are highly optimistic. See for example, González, "Flota Atunera de Cuba ...," *op. cit.*, pp. 20-22 and "Pescadores de la FAC producen más de un millón de pesos en divisas," *Mar y Pesca*, March 1978, p. 3.
665. Rodríguez, *op. cit.*, September 13, 2001.
666. Rodríguez, *op. cit.*, September 22, 2001.
667. Details on the Brazilian fleet and operations are available in the Brazilian chapter of this report.
668. See for example, Fernandez Cuervo, *op. cit.*, March 17, 1982
669. Rodríguez, Nieto, and Castro, "Aspectos comparativos ..., " *op. cit.*, p. 171.
670. "Tuna fishing off Cuba," *Juventud Rebelde*, March 3, 1982 [translation].
671. Rodríguez, *op.cit.*, September 22, 2001.
672. Rodríguez, "Una revision ...," *op. cit.*, p. 466.
673. Rodríguez, "Una revision ...," *op. cit.*, p. 467.
674. Ernest Hemingway, "Cuban fishing," in Brian Vesey-Fitzgerald and Francesca LaMonte, ed., *Game Fish of the World* (Harper & Brothers: New York, 1949), p. 156-160.
675. Francesca LaMonte, *Marine Game Fishes of the World* (Doubleday: New York, 1952), p. 168.
676. Martínez, "The Cuban fishing industry," *op. cit.*, p. 5.
677. Reports demonstrating the Cuban approach to tourism until the 1990s are legion. The author during a 1980 visit to Cuba found it difficult to obtain toilet paper even while staying in a major Havana hotel. All elevators had operators who would only allow you to get out on the floor where your room was located. Cuban friends and associates could not visit you in your room. A colleague who wanted to visit a friend on the floor beneath him was confronted by a guard with a automatic rifle when he tried to use the stairwell.
678. U.S. Department of State, "Cuba," *op. cit.*, pp. 3-4.
679. "Varas afiladas: Pescadores deportivos del Río Almendares," *Mar y Pesca* January 1990, number 292, pp. 16-17.
680. "Federacíon Cubana de Pesca Deportiva," *Mar y Pesca*, September 1989, number 288, pp. 30-31.

681. See for example, Ismael Leon Almeida, "Peces deportivos cubanos," *Mar y Pesca*, April 1990, number 295, pp. 23-25.
682. Jorge Julio González, "Torneo de la aguja Hemingway," *Mar y Pesca*, August, 1986, pp. 15-17.
683. Rodríguez, *op. cit.*, September 16, 2001.
684. Rodríguez, *op. cit.*, September 16, 2001.
685. Guitart, Juárez, and Milera, "Análisis de las pesquerías deportivas ...," *op. cit.*, p. 128.
686. Guitart, Juárez, and Milera, "Análisis de las pesquerías deportivas ...," *op. cit.*, p. 136.
687. InTheBite.Com, "19th Annual blue Marlin International Tournament--Cuba, September 11-16, 2000," internet site accessed December 14, 2000: http://www.inthebite.com/cuba/bluemarlin.html
688. Franco Fumolo, personal communications, June 22, 1997.
689. D.P. Taylor, "No problem: Sportfishing in Montego Bay, Jamaica," internet site accessed November 6, 2000: http://www.montego-bay-jamaica.com/ajal/noproblem/
690. World Wide Holidays Direct, "Fishing," internet site accessed November 6, 2000: http://www.worldwideholidays.co.uk/c-fishing.html
691. IGFA, "International tournament calendar," *The International Angler*, September-October 1996, p. 15.
692. InTheBite.Com, "19th Annual blue Marlin International Tournament--Cuba, September 11-16, 2000," internet site accessed December 14, 2000: http://www.inthebite.com/cuba/bluemarlin.html
693. Amanda Gibson, Worldwide Holidays Direct, personal communications, November 8, 2000.
694. "Calendar," *The International Angler*, May-June, 1999, p. 19.
695. "Hemingway Marlin Tournament," internet site accessed December 14, 2000: http://hemingwaymarline.freeyellow.com/
696. Guitart, Juárez, and Milera, "Análisis de las pesquerías deportivas ...," *op. cit.*, p. 126.
697. Gibson, *op. cit.*, November 8, 2000.
698. Guitart, Juárez, and Milera, "Análisis de las pesquerías deportivas ...," *op. cit.*, p. 126. The 1970 date may be a typo, it probably should have read 1978.
699. IGFA, "Calendar," *International Angler,* November-December, 1999, p. 19.
700. "Calendar," *The International Angler*, January-February, 1999, p. 15.
701. Franco Fumolo, Italian tour operator, personal communications, June 22, 1997.
702. Worldwide Holidays Direct, "Fishing," *op. cit.*
703. Ellen Peel, Billfish Foundation, personal communications, December 14, 2000.
704. Rodríguez, *op. cit.*, September 22, 2001.
705. Anonymous Cuban source, *op. cit.,* March 16, 2000.
706. Escobal, "Implantan normas ...," *op. cit.*
707. Rodríguez, *op. cit.*, August 17, 2001.
708. Rodríguez believes that some other factors may be involved besides changes in Cuban fishing strategy, such as changing relative patterns of abundance. Rodríguez, *op. cit.*, September 16, 2001.
709. Cuban researchers remember the shark bycatch being about 25 percent of the overall catch. Rodríguez, *op. cit.*, September 16, 2001. Available data shows that this was in fact the approximate bycatch levels beginning in 1981 (appendix C7a). Cuban data submitted to FAO, however, shows much lower shark bycatches before 1981. In fact bycatch levels are so low, in some years only 1-2 percent, that the data must be treated with caution. The sharp change in 1981 may be a change in the statistical system rather than actual increases in bycatch levels. If the Cuban bycatch data is accurate, it would suggest a change in fishing operations.

SECTION VII. (Catch)

710. This tendency on the part of the Cuban press and MIPES has been noted by Cuban as well as foreign observers. See for example, Reinaldo Cosano Alén, "Irritantes cifras da el Ministerio de la Industria Pesquera," *CubaNet*, May 1, 2000.
711. The FAO Fishery Information, Data and Statistics Unit (FIDI) incorporates in its capture production database most of the tuna catch statistics provided by tuna commissions (ICCAT for the Atlantic, IOFC for the Indian Ocean, SPC for the western Pacific and IATTC for the eastern Pacific), but not all as in few cases FAO has additional information. The FAO Fishing Areas for Statistical Purposes for the Atlantic and the ICCAT areas do not coincide as can be verified in the respective statistical yearbooks. The partition of the Atlantic Ocean used by ICCAT vary among the tuna species. In the past, FAO-FIDI assigned the ICCAT data to its Fishing Areas trying to match as much as possible the distribution of the species, the fisheries, and the countries reporting the catches--although this proved to be a difficult undertaking. In recent years, ICCAT has made available at its web site the CATDIS

database, where catches are assigned to latitude-longitude rectangles, mostly 5° squares (Caribbean overview, series D appendices). Previous releases of this database contained flaws and, after an in-depth revision, a new version of CATDIS with data up to 1997 was made available in July 2000 at the ICCAT web page (http://www.iccat/es/Stats.html). Unfortunately this database is 2 years behind respect to FAO and other ICCAT statistics (e.g. CATDIS now is updated up to 1997 while FAO is presently finalizing the 1999 statistics, expected to be released in March 2001). This time gap between CATDIS and the FAO database has so far prevented the full use of the CATDIS data to directly assign ICCAT statistics to FAO fishing areas but FAO has used CATDIS to correct some major discrepancies between the geographical distribution of catches shown in this database and the FAO fishing areas. Recently, in the framework of the Coordinating Working Party of Fishery Statistics (CWP) an Integrated Data File of Atlantic Fishery Statistics has been developed. This includes Atlantic fishery statistics provided by FAO, ICCAT, ICES and NAFO. For its contribution to this common database, ICCAT has added a new field to its tuna statistics to host information on FAO Fishing Areas. Luca Garibaldi, FAO Fishery Statistician (Capture Fisheries). personal communications, November 9, 2000.

712. Rodríguez, *op. cit.*, September 16, 2001.

713. Arata, "A contribution to the life history ..., " *op. cit.*, pp. 188 and 234.

714. Rene J. Buesa, "Fishing zones for Cuban tuna vessels," unpublished CIP report, September 11, 1962.

715. Buesa, "Fishing zones ...," *op. cit.*

716. Ubeda, "But ... why ...," *op. cit.*

717. Ubeda, "But ... why ..., "*op. cit.*

718. Ubeda, "But ... why ...," *op. cit.*

719. FAO, "Mejora y incremento ...," *op. cit.*, p. 1.

720. Ubeda, "But ... why ...," *op. cit.*

721. Ubeda, "But ... why ...," *op. cit.*

722. Ubeda, "But ... why ..., " *op. cit.*

723. Achurra Larrain, "Los antecedentes ...," *op. cit.*, p. 97.

724. Ubeda, "But ... why ..., " *op. cit.*

725. FAO, *Yearbook of Fishery Statistics*, 1970.

726. For details see "Ports: Las Palmas".

727. Cuban sources variously refer to both 1973 and 1974 as the date FAC was created.

728. Ubeda, "But ... why ...," *op. cit.*

729. Valle and Rodríguez, "Intensidad total ...," *op. cit.*, p. 47.

730. This is not an artisanal fishery for which very rough estimates often have to be used, but rather a sophisticated distant-water fishery. Cuban both before and after 1976-79 provided detailed catch data. Thus it is unclear as to why during 1976-79 only estimates were provided. The authors note that during these years Cuba was heavily involved in military operations supporting the Angolan MPLA Government. Some of the FAC vessels could have been diverted as transport vessels, but this is only a speculation. A Cuban researcher working with the feet at this time reports that there was no "massive or evident withdrawal of vessels from fishing operations". Rodríguez, *op. cit.*, September 16, 2001.

731. One researcher describes the rough estimates as due to bureaucratic problems ("deliz burocratico"). Rodríguez, *op. cit.*, September 16, 2001.

732. "Plan de capturas 1977," *Industrias Pesqueras*, December, 1978.

733. González, "Flota Atunera de Cuba ...," *op. cit.*, p. 20.

734. U.S. Interests Section, Havana, "Cuban fishing vessel purchases," message number 30005, September 27, 1978 and U.S. Interests Section, Havana, "Cuban fishing vessel purchases," message number 3223, October 16, 1978.

735. González, "Flota Atunera de Cuba ...," *op. cit.*, pp. 20-22.

736. "Hacia niveles superiores de pesca," *Mar y Pesca*, March 1978, p. 3 and "Pescadores de la FAC producen más de un millón de pesos en divisas," *Mar y Pesca*, March 1978, p. 3.

737. The authors have encountered considerable difficulty in using Cuban media reports. Some creativity is often needed in extracting useful information from the Cuban media. In Communist countries, problems are often not frankly discussed in the media. In many instances the public is not informed of a problem until articles begin to appear describing how a problem is being solved. These articles may thus be more informative about the existence of a problem rather than the usually overly optimistic report that a problem has been solved. In this regard, Cuban media reports of improving efficiencies and savings in vessels repair may reflect the continuing poor economic performance of the fleet and increasing maintenance problems more than successes in addressing these difficulties. Academics working on Cuba have indicated that they have encountered similar difficulties in assessing Cuban media reports, but do not want to be identified as saying this. Cuban observers experience the same problems. Cosano

Alén, "Irritantes cifras da el Ministerio de la Industria Pesquera," *op. cit.*
738. Berry, "Trip report ...," *op. cit.*
739. "El acumulado de la FAC al 113 por ciento," *Mar y Pesca*, January 1980, p. 5.
740. Fernando Davalos, "Tuna catch goal exceeded," *Granma*, November 22, 1979.
741. "Tuna catch for 1979," *Cuba Economic News*, 1980, No. 103, p. 14.
742. Davalos, "Tuna catch goal exceeded," *op. cit.*
743. "Tuna catch for 1979," *Cuba Economic News*, 1980, No. 103, p. 14.
744. Davalos, "Tuna catch goal exceeded," *op. cit.*
745. Guitart, Juárez, and Milera, "Análisis de las pesquerías deportivas ...," *op. cit.*, p. 137.
746. Morena and Rodríguez, "Cuban tuna fisheries ...," *op. cit.*, p. 233.
747. "Cuban accuses Morocco of 'brutal' attack on ships," *New York Times*, July 15, 1980. Moroccan authorities reportedly believed that the Cubans were supplying arms to Western Saharan separatists who the Cubans had been supporting diplomatically. (The Western Sahara is the former Spanish Sahara.) The incident is notable as the Moroccans clearly believed that the FAC tankers were being used for purposes other than supplying Cuban longliners. While the authors have no information on such alleged activities, the news reports do pinpoint the location of two FAC longliners relatively close to the African coast and to each other. The authors do not have sufficient details on Cuban tanker operations to fully evaluate this. Cuban officials claim that the tankers were supplying fuel to tuna longliners fishing in the area. "Government silent," Madrid radio broadcast EFE 0032 GMT, July 14, 1980. The Cubans also report that the two tankers had left Las Palmas a few days earlier. "Authorities criticize attack on tankers off Africa," Buenos Aires radio broadcast, LATIN, 0623 GMT, July 14, 1980. It does seem unusual, however, that both tankers would be located so close to the African coast and the Canary Islands north of the area where Cuban longliners normally operated (figure 41). Cuban catch data submitted to ICCAT confirm that this area is north of the Cuban fishing grounds. Cuban sources confirm that the longline fleet did not operate in the area off the Western Sahara where the tankers were attacked. Rodríguez, *op. cit.*, September 13, 2001. One would have also thought that the two tankers would have been dispersed in different areas more in the middle of fleet operations to increase their accessibility to the fleet. Cuban sources report that the tankers left Las Palmas to supply Cuban tuna boats operating in the central Atlantic. "Details of attack, aftermath," Havana Domestic Service, 1045 GMT, July 14, 1980. The Western Sahara is located to the east of Las Palmas and the central Atlantic to the west of las Palmas. However, any full assessment requires more information on the Cuban tanker refueling operations than is available to the authors at this time.
748. Rodríguez, *op. cit.*, September 16, 2001.
749. Ubeda, "Tuna fishing ..., *op. cit.*
750. It is possible that the shift in shark bycatches shown in the Cuban data is a change in the statistical system rather than a change in the fishery. The level of shark bycatches before 1981 (appendix C7a) are so low that the data must be used with caution.
751. Rodríguez, Nieto, and Castro, "Aspectos comparativos ..., " *op. cit.*, p. 171.
752. Rodríguez, *op. cit.*, September 16, 2001.
753. Luis Ubeda, "En el sindicato de los corajudos: Chequeo nacional de emulación al Rojo Vivo," *Mar y Pesca*, February 1984, number 221, pp. 32-35.
754. "El mejor saludo a reunión partidista en la FAC," *Mar y Pesca*, March 1984, number 222, p. 6.
755. Moreno y Pol, "Contribución al estudio ...," *op. cit.*, p. 196.
756. Moreno y Pol, "Contribución al estudio ...," *op. cit.*, p. 196.
757. "Efforts by fishing fleet to save foreign currency," Havana television service, 1800 GMT, February 19, 1985 [translation].
758. D. Guitart, "Biología pesquera del emperador o pez espada *Xiphias gladius* Linnaeus (Teleostomi: Xiphidae) en las aguas de Cuba," *Poeyana, Serie B*, No. 1, 1964 and Muñoz, Moreno, Rodríguez, and Pol, "Características bilógico-pesqueras ...," *op. cit.*, p.45.
759. This is another a good example of the difficulty associated with using Cuban press sources. Usually the Cuban media will not publicize data that shows negative trends. Thus in a year that a major fishery such as tuna declines, the Cuban media simply reports that the plan was met.
760. "Cumplio la FAC su plan de captura del año," *Mar y Pesca*, December, 1987, number 267, p. 3.
761. "Cumplio la FAC su plan de captura del año," *Mar y Pesca.*, December 1987, number 267, p. 3.
762. The overall FAC catch in 1985 while still operating out of the Canaries was 8,800 t, and 56 percent was swordfish and yellowfin. By 1989 when FAC was operating from Cuban ports, the catch was only 5,100 t, 34 percent swordfish and yellowfin (appendix C8e). Other factors such as Soviet oil deliveries and maintenance also affected fleet operations, but shifting from the Canaries to Cuban ports may have also been significant.

763. FAO, *Yearbook of Fishery Statistics*, 1990, p. 299.
764. "Cuba: Record en la pesca de tunidos," *Industrias Pesqueras*, April 15, 1989, p. 123.
765. Rodríguez, *op. cit.*, September 6, 2001.
766. FAO, *Yearbook of Fishery Statistics*, 1990, p. 299.
767. ICCAT, "Report of the meeting of the standing committee on research and statistics," *ICCAT Report* Part II, 1992-93 (ICCAT: Madrid, Spain, 1994), p. 174.
768. Baisre, *op. cit.*, October 9, 2000.

SECTION VIII. (Ports)

769. Berry, "UNDP review ...," *op. cit.*
770. Kravanja, "Soviet and Cuban fisheries ...," *op. cit.*, p. 158.
771. The Cuban tuna longline fleet was still part of the Flota Cubana de Pesca (FLOCUBA) in 1970.
772. Rodríguez, *op. cit.*, September 16, 2001.
773. Kravanja, "Soviet and Cuban fisheries ...," *op. cit.*, p. 160.
774. Until October 31, 1973, the Cuban tuna fleet was directed from the Las Palmas organizational center which was under fleet command. After October 1973, the newly created FAC began controlling the longline fleet from Havana. Las Palmas continued only as a resupply and repair facility. "Tuna fishing in distant seas," *Bohemia*, January 18, 1974, pp. 22-29.
775. FAO, "Mejora y incremento ...," *op. cit.*, p. 1 and 12.
776. Ubeda, "But ... why ...," *op. cit.*
777. Moreno, "National report of Cuba," 1984-85 *op. cit.*, p. 245.
778. "Cumplio la FAC su plan de captura del año," *Mar y Pesca*, December 1987, number 267, p. 3.
779. "Tuna fishing in distant seas," *op. cit.*, p. 83.
780. "Tuna fish in distant seas," *Bohemia*, January 18, 1974, p. 22. Language Services Division (F/43), NMFS, translation.
781. "Tuna fishing in distant seas," *op. cit.*, p. 83.
782. Kravanja, "Soviet and Cuban fisheries ...," *op. cit.*, p. 159.
783. "Cuban envoy on fishing fleet," Quito Voz de los Andes, 1730 GMT, March 17, 1980.
784. Farrington, "Spearfish of the world," *op. cit.*, p. 153.
785. Valle, Moncada, and Hirtenfeld, "La pesca de atún en Cuba," *op. cit.*, p. 27.
786. Rodríguez, "Una revision ...," *op. cit.*, p. 465.
787. "Modern fisheries base inaugurated," FIS website, http://www.fis-net.com/fis/hotnews/", posted June 28, 1999.
788. Pol, Muñoz, Moreno, and Rodríguez, "Evolución de la abundancia ...," *op. cit.*, pp. 41-49.
789. Farrington, "Spearfish of the world," *op. cit.*, p. 153.
790. Luis Ubeda, "Tuna in the Caribbean," *Mar y Pesca*, July 1974, pp. 36-39.
791. "Combinado pesquero en la ciudad industrial de Cienfuegos, Cuba," *Técnica Pesquera,* October, 1971, p. 26 and "Casi lista la ampliación del complejo pesquero de Cienfuegos, en Cuba," *Técnica Pesquera*, October, 1976..
792. Joseph L. Martinez, "The Cuban shark fishery," *Fishery Leaflet*, No. 250, part I (Fish and Wildlife Service: Washington, D.C., July, 1947), p. 2.
793. Farrington, "Spearfish of the world," *op. cit.*, p. 153.
794. Hemingway mentions fishermen from Cojímar taking makos with handlines, not the easiest way to make a living. Hemingway, "Cuban fishing," *op. cit.*, p. 157. Another source specifies that the artisanal fishermen targeting marlin were using handlines. Farrington, "Spearfish of the world," *op. cit.*, 153.
795. Rawlings, "A report on the Cuban tuna fishery," *op. cit.*, p. 20.
796. Moreno and Pol, "Contribución al estudio ...," *op. cit.*, p. 191.
797. Espinoza, Sosa, Moreno, and Quevedo, "Aspectos biologicos ...," *op. cit.*, pp. 266-286 and Pol, Muñoz, Moreno, and Rodríguez, "Evolución de la abundancia ...," *op. cit.*, pp. 41-49.
798. "Coloma fishing complex," *Juventud Rebelde*, October 31, 1973, p. 1 and "New pier," Havana domestic television service, 1800 GMT, December 27, 1976..
799. Valle, Moncada, and Hirtenfeld, "La pesca de atún en Cuba," *op. cit.*, p. 27.
800. Rodríguez, "Una revision ...," *op. cit.*, p. 465.
801. Ubeda, "Tuna fishing ...," *op. cit.*, p. 9.
802. Antonio Conte, "Beyond the harbor," *Cuba International*, December 1970, p. 3.
803. Abascal, "Cuba y la pesca ...," *op. cit.*, pp. 12-13.

804. The authors have noted Cuban estimates varying from 35-50 million pesos. Given the accounting systems prevalent in Cuba during the 1960s when the port was built, there probably is no precise accounting of actual costs.
805. Kravanja, "Soviet and Cuban fisheries ..." *op. cit.*, p. 149.
806. U.S. Interests Section, Havana, "Cuban fishing vessel purchases," message number 3223, October 16, 1978.
807. Davalos, "Tuna catch goal exceeded," *op. cit.*, p. 1.
808. "El Alecrín volverá a navegar," *Mar y Pesca*, October, 1987, pp. 5-6.
809. Kravanja, "Soviet and Cuban fisheries ..., p. 150.
810. "Soviet-built floating dock for Cuba," *Vodnyy Transport*, April 9, 1977, p. 4.
811. Kravanja, "Soviet and Cuban fisheries ..." *op. cit.*, p. 149.
812. Conte, "Beyond the harbor," *op. cit.*, p. 14.
813. Fernando Davalos, "Havana fishing port fulfills 1981 plan ahead of schedule," *Mar y Pesca,* November 4, 1981, p. 2.
814. Conte, "Beyond the harbor," *op. cit.*, p. 3.
815. See "V. Shipyards."
816. Rodríguez, *op. cit.*, September 16, 2001.
817. Guitart, Juárez, and Milera, "Análisis de las pesquerias deportivas ...," *op. cit.*, pp. 125-142.
818. Pol, Muñoz, Moreno, and Rodríguez, "Evolución de la abundancia ...," *op. cit.*, pp. 41-49.
819. Harold Ortiz Ríos, "Una base para supertanqueros," *Mar y Pesca*, October 1987, number 265, pp. 40-41.
820. Ubeda, "Tuna in the Caribbean," *op. cit.*
821. Ubeda, "Tuna in the Caribbean," *op. cit.*
822. Rawlings, "A report on the Cuban tuna fishery," *op. cit.*, p. 20.
823. Ubeda, "Tuna in the Caribbean," *op. cit.*
824. The author Dr. Andrés Rodríguez has retained a copy of the manuscript.
825. The authors describe the port sampling program at Puerto Esperanza and several other ports where the baitboats land their catch. Valle, Moncada, and Hirtenfeld, "La pesca de atún en Cuba," *op. cit.*, p. 27.
826. "Completa su cuarto viaje el *Golfo de Batabano*," *Mar y Pesca*, December, 1978, p. 6.
827. Rodríguez, "Una revision ...," *op. cit.*, p. 465.
828. Rodríguez, Muñoz, Frias, Moreno, and Pol, "Características del emperador ...," *op. cit.*, p. 166.
829. "New jetty for fishing vessels," *Havana* home service, 1145 GMT, November 27, 1984.
830. "Modern fisheries base inaugurated," FIS website, http://www.fis-net.com/fis/hotnews/", posted June 28, 1999.
831. U.S. Trade and Economic Council, "Expanded Santiago de Cuba marina under construction," *Economic Eye on Cuba,* October 12-18, 1998," internet site accessed December 14, 2000: http://www.cubatrade.org/eyeonz12.html
832. A. Rodríguez, *op. cit.*, August 15, 2001.
833. M. del C. Sotolongo, E. Giménez, E. Pozo, A. Alvarez, and M. Palivero, "Análisis de las pesquerías de peces en la empresa pesquera las tunas," *Revista Cubana de Investigaciones Pesqueras*, Vol. 18, no. 1, 1993-94, pp.46-52.
834. Cubamar, "We can do business on ...," internet site accessed October 31, 2000: http://www2.cubamar.cu/argus/english/negociar.htm
835. Lt. Ben Cooper, 7th District, U.S. Coast Guard, personal communications, March 1, 2000.
836. Dr. Chia-Lin Chen, Specialist Economic Division, Taipei Economic and Cultural Representative, personal communications, November 6, 2000.

SECTION IX. (Transshipments)

837. ICCAT, "Secretariat report on statistics and coordination of research," *ICCAT Report* Part II, 1984-85 (ICCAT: Madrid, Spain, 1986), p. 28 and ICCAT, "Secretariat report on statistics and coordination of research," *ICCAT Report* Part I, 1986-87 (ICCAT: Madrid, Spain, 1987), p. 37.
838. "Distant water tuna fishing developed by Cuba," *Bohemia*, January 18, 1974, pp. 22-29.
839. Some foreign fishing vessels may call at other Cuban ports, especially Santiago. The authors, however, have no confirmation at this time.
840. Kawaguchi, "Exploratory tuna longline fishing ...," *op. cit.*, p. 61.
841. Cooper, *op. cit.*, March 1, 2000.

SECTION X. (Processing and Products)

842. Cubamar, "Cuba y su industria pesquera," internet posting accessed December 28, 1999: http://www.cubamar.cu/pesca/pesca.htm
843. A. Garcia, unpublished descriptive information on the Cuban fishing industry, Centro de Investigaciones de la Economía Internacional, Universidad de la Havana, 1996.
844. Adams, "An overview ...," *op. cit.*
845. Indipes, "Asociación Indipes," internet posting accessed December 28, 1999: http://www.sea-world.com/indipes/indipes.htm
846. Indipes, "Fresh and frozen products," internet posting accessed December 28, 1999: http://www.sea-world.com/indipes/ifrescos.htm
847. Rodríguez, *op. cit.*, September 22, 2001.
848. Adams, "An overview ...," *op. cit.*
849. Indipes, "Canned goods," internet posting accessed December 28, 1999: http://www.sea-world.com/indipes/ienlata.htm
850. Pesca Caribe, "Conservas," internet posting accessed December 28, 1999: http://www.fis-net.com/pescacaribe/conserva.htm
851. Indipes, "Elaboration of smocked products," internet posting accessed December 28, 1999: http://www.sea-world.com/indipes/iahumada.htm
852. Indipes, "El proceso de secado de aletas de tiburón," internet posting accessed December 28, 1999: http://www.sea-world.com/indipes/itiburon.htm
853. Joaquin Oramas, "Resaltan propuesta de Cuba sobre elaboración de normas para aletas secas de tiburón," *Granma*, April 20, 1985, p. 2.
854. Baisre, *op. cit.,* October 9, 2000.
855. Adams, Sánchez Vega, and García Alvarez, "An overview ...," *op. cit.*, p. 9.
856. Moncada, *op. cit.*, May 6, 2001.

SECTION XI. (Companies)

857. Chuck Adams, "An overview of the Cuban commercial fishing industry and implications to the Florida seafood industry of renewed trade," *International Working Paper* IW93-3 (University of Florida: Gainesville, May, 1998) and Joyce, "Spiny lobster fishery ...," *op. cit.*, pp. 489-490.
858. The authors have no details on Cuban accounting practices. It is not clear if accounts were kept on hard currency earnings and FAC received a share of its earnings in hard currency or if hard currency earnings went into a centralized pool and were then apportioned on the basis of Government policies and priorities. However implemented, this pooling of earnings meant in effect that the earnings of efficient, productive enterprises were often used to sustain the inefficient activities of unprofitable companies.
859. Anicia E. García Alvarez, Centro de Investigaciones de Economía Internacional, personal communications, April 1, 1998.
860. Decreto Ley 164, 1996.
861. Chuck Adams, Anicia E. García Alvarez, and Plácido Sánchez Vega, "Recent changes in the Cuban management structure," paper presented ar the IIFET 2000, Microbehavior and Macroresults Conference, July 10, 2000, Oregon State University.
862. SLCs were first tried at military enterprises. They were introduced in an experimental basis at the Isabela de Sague Lobster Enterprise. As a result, costs fell 15 percent and production increased 10 percent. "Experimental reforms on salary," *Cuban Economic News*, December 1, 1998 and "New type of contract for fishing endeavors," *Cuban Economic News*, December 19, 1998.
863. See for example Cubamar, "La Pesca," internet site accessed November 10, 2000: http://www2.cubamar.cu/anpp/lapesca.htm
864. See for example, Alida Viso Bello, "Government threatens those who fish without authorization," *The Cuba Free Press Project*, October 1, 1999.
865. A review of *Mar y Pesca* through the 1980s, for example, shows no discussion of a problem with illegal fishing in Cuba.
866. Moncada, *op. cit.*, May 6, 2001.
867. Adams, García Alvarez, and Sánchez Vega, "Recent changes ...," *op. cit.*

868. Adams, Sánchez Vega, and García Alvarez, "An overview ...," *op. cit.*, p. 4.
869. Adams, "An overview ...," *op. cit.*
870. García Alvarez, *op. cit.*, November 24, 2000.
871. Adams, "An overview ...," *op. cit.*
872. García Alvarez, *op. cit.*, November 24, 2000.
873. Baisre, "Chronicle ...," *op. cit.*
874. C. Mesa-Largo, *Cuba After the Cold War* (University of Pittsburgh Press: Pittsburgh, 1993) and J.F. Pérez López, *Cuba's Second Economy from Behind the Scenes to Center Stage* (Transaction Publishers: New Brunswick, New Jersey, 1995).
875. Adams, Sánchez Vega, and García Alvarez, "An overview ...," *op. cit.*, p. 6.
876. The best available description of the process is Adams, Sánchez Vega, and García Alvarez, "An overview ...," *op. cit.*, p. 6.
877. FIS Europe, "AGECREW signs top contract," *FIS Hot News*, October 25, 1999.
878. Puente, *op. cit.*, November 10, 2000.
879. Cubamar, "Argus-Avos," internet posting accessed December 28, 1999: http://www.cubamar.cu/argus/iavos.htm
880. Cubamar, "Argus-Asticar," internet posting accessed December 28, 1999: http://www.cubamar.cu/argus/iasticar.htm
881. Cubamar, "Argus-Astilleros," internet posting accessed December 28, 1999: http://www.cubamar.cu/argus/iastille.htm
882. Cubamar, "Argus-Comelec," internet posting accessed December 28, 1999: http://www.cubamar.cu/argus/icomelec.htm
883. Cubamar, "Argus-Navalec," internet posting accessed December 28, 1999: http://www.cubamar.cu/argus/inavalec.htm
884. Cubamar, "Argus-Ceprona," internet posting accessed December 28, 1999: http://www.cubamar.cu/argus/iceprona.htm
885. Moreno and Pol, "Contribución al estudio ...," *op. cit.*, p. 191.
886. Espinoza, Sosa, Moreno, and Quevedo, "Aspectos biologicos ...," *op. cit.*, p. 275.
887. Moreno and Pol, "Contribución al estudio ...," *op. cit.*, p. 191.
888. Marris, "Cuba. Qué pasa?," *op. cit.*, p. 94.
889. "Tuna fishing in distant seas," *Bohemia*, January 18, 1974, pp. 22-29 and Caribex, "Caribex," internet posting accessed December 28, 1999: http://www.sea-world.com/caribex/
890. CRIBEX, "Otros," internet posting accessed December 28, 1999: http://www.sea-world.com/caribex/otros.htm
891. CARIBEX, "Grupo Caribe," internet posting accessed December 28, 1999: http://www.sea-world.com/caribex/gc.htm
892. Joseph L. Martinez, "The Cuban shark fishery," *Fishery Leaflet*, No. 250, part I (Fish and Wildlife Service: Washington, D.C., July, 1947), p. 2.
893. Available reports, however, do not specify the gear used. LaMonte, "Note on breeding grounds ...," *op. cit.*, p. 258.
894. Moreno and Pol, "Contribución al estudio ...," *op. cit.*, p. 191.
895. Espinoza, Sosa, Moreno, and Quevedo, "Aspectos biologicos ...," *op. cit.*, pp. 266-286.
896. INDIPES, "Commercialization of seafood products at special free fish stores all over the country," internet site accessed December 28, 1999: http://www.sea-world/indipes/ipescade.htm
897. U.S. Interests Section, Havana, "Cuban fishing vessel purchase," message number 3223, October 16, 1978.
898. Ubeda, "But ... why," *op. cit.* Other sources suggest FAC was created in 1973.
899. The authors have noted both 1973 and 74 cited as to when the two fleets were separated.
900. "All of these reasons lead to the conclusion that in order to operate both fleets efficiently, they should be separated. In our case [the FAC], we concentrate everything on the tuna fishing operations. We have begun to control the crews of the fishing vessels, so that the captains and chief engineers are always the same, and so that each crew member thinks of *his boat*, and knows its method of fishing and its zone of operations thoroughly ..." Roberto Ferrer, FAC Director, interview in Ubeda, "But ... why," *op. cit.* Garcia, Chief of Naval Operations, and Pontes, Chief of the Staffing Department also participated in the interview.
901. Ubeda, "Why ... tuna ...," *op. cit.*

902. The best indicator of FAC production in the absence of actual FAC catch data is probably Cuba's yellowfin tuna catch (appendix C9c2). Yellowfin was the primary target species and especially valuable as it could be exported.
903. Achurra Larrain, "Los antecedentes ...," *op. cit.*, p. 97.
904. See for example González, "Flota Atunera de Cuba in 1978 ...," *op. cit.*, p. 22.
905. Ubeda, "Tuna fishing ...," *op. cit.*, p. 9.
906. Puente, *op. cit.*, November 10, 2000.
907. Available Cuban sources were not precisely sure when FAC closed, but estimated 1996. The authors note that substantial Cuban swordfish catches in the eastern Atlantic ended in 1996 suggesting that this was the year that FAC ceased operations (appendix C1a2b). A small FAC office at MIP after 1996 appears to have continued functioning to wind down operations.
908. Puente, *op. cit.*, November 10, 2000. One Cuban observer reports that a small number of FAC longliners may still be operational. Cosano Alén, *op. cit.*, November 10, 2000.
909. Puente, *op. cit.*, November 10, 2000.
910. Inchcup, *op. cit.*, June 9, 2000.
911. Baisre, *op. cit.*, October 9, 2000.
912. Anonymous Cuban source, August 22, 2000.
913. The Flota Cubana de Pesca is sometimes referred to as FLOCUBA and sometimes as the FCP.
914. Ubeda, "But ...why ...," *op.cit.*
915. FAO, "Mejora y incremento ...," *op. cit.*, p. 1.
916. Details on FLOCUBA operations are available in Dennis Weidner and David Hall, "Latin America," *World Fishing Fleets*, IV (NMFS: Silver Spring, 1993), pp. 115-138.
917. Roberto Ferrer, FAC Director, interview in Ubeda, "But ... why," *op. cit.*
918. The fact that lack of access to subsidized fuel forced the Cubans to idle their fillet is one of many indicators that the fleet was unprofitable and ran substantial deficits.
919. Weidner and Hall, "Cuba," *op. cit.* and Suárez Caabro, *El Fracaso de FLOCUBA*, *op. cit.*
920. Anonymous Cuban source, August 22, 2000.
921. Moreno and Pol, "Contribución al estudio ...," *op. cit.*, p. 191.
922. Caribex, "Grupo Caribe," internet posting accessed December 28, 1999: http://www.sea-world.com/caribex/gc.htm
923. Indipes, "Asociación Indipes," internet posting accessed December 28, 1999: http://www-sea-world.com/indipes/indipes.htm
924. Tania Díaz Castro, "La mesa vacía, ¡sin pescado," *CubaNet*, January 27, 2000.
925. Moreno and Pol, "Contribución al estudio ...," *op. cit.*, p. 191.
926. U.S. Interests Section, Havana, "Cuban fishing vessel purchase," message number 3223, October 16, 1978.
927. Government announcements claim that prices were "regulated by supply and demand" and could increase if circumstances justified it. Prices are in fact simply arbitrarily set by the Government. U.S. Interests Section, Havana, "Cuban Government opens fish market," message number 294, January 12, 1996.
928. The term "free" means there are no limits on purchases, but they are market prices. The source indicated that the stores are all over the country, but then described meeting the needs of consumers in the city and province of Havana. The release also interestingly described the profitability of MERCOMAR, "90.0 MP daily." We are not positive, but believe that means 90,000 pesos daily. INDIPES, "Commercialization of seafood products at special free fish stores all over the country," internet site accessed December 28, 1999: http://www.sea-world.com/indipes/ipescade.htm
929. Pesca Caribe, "Pesca Caribe," internet posting accessed December 28, 1999: http://www.sea-world.com/pescacaribe/ipcmain.htm
930. Pesport, "Asociación Pesport," internet posting accessed December 28, 1999: http://www.sea-world.com/pesport/ipesport.htm
931. Pesport, "Dragnets," internet posting accessed December 28, 1999: http://www.sea-world.com/pesport/idragnet.htm and Pesport, "Nexus Reefer," internet posting accessed December 28, 1999: http://www.sea-world.com/pesport/inexus.htm
932. Fishing units are the actual fishing enterprises that make up the APPs. These units would include the former cooperatives or combinados that have been grouped together in each province. They have administrative and technical (including biologists) staff and the fishermen themselves who are in effect employees of these units. Also included are shore staff that make the fishing gear (nets, traps, longlines, etc), processing workers, a other individuals involved in marketing and distribution. These units also provide supplies to the fishermen such as food

and fuel. These units vary greatly in size and importance. Some are located in provincial capitals and administer the business at the provincial level. Other units are located along the coast and are involved in actual fishing operations or activities like vessel maintenance and repair. Bustamante, *op. cit.*, August 13, 2001.
933. Claro, Baisre, and Garcia-Arteaga, "Management of fishery resources," *op. cit.*
934. Adams, "An overview ...," *op. cit.*
935. Claro, Baisre, and Garcia-Arteaga, "Management of fishery resources," *op. cit.*
936. Puente, *op. cit.*, November 10, 2000.
937. Anonymous source, *op. cit.*, July 27, 2001.

SECTION XII. (Markets)

938. Farrington, "Spearfish of the world," *op. cit.*, p. 153.
939. Karen DeYoung, "Cubans can afford more luxuries, but for which Cubans," *Washington Post*, August 29, 1977, p. A19.
940. Ann Crittenden, "The Cuban economy: How it works," *New York Times*, December 18, 1977.
941. A good historical review of the rationing system is available in Medea Benjamin, Joseph Collins, and Michael Scott, *No Free Lunch, Food and Revolution in Cuba Today* (Institute of Food and Development Policy, San Francisco, California, 1985).
942. Héctor Maseda, "Fresh fish in Cuba; ghost of a food," *CubaNet*, September 11, 2000.
943. Cosano Alén, *op. cit.* November 10, 2000.
944. Gordon, "Cuba's entrepreneurial socialism," *op. cit.*, pp. 18-30.
945. Cosano Alén, *op. cit.*, November 10, 2000.
946. Karen DeYoung, "Cuba climbs economic ladder," *The Washington Post*, July 24, 2000, p. A20.
947. "A million workers have access to U.S. dollars in Cuba," *Cuban Economic News*, November 30, 1998.
948. Cubamar, "Cuba y su industria pesquera," internet posting accessed December 28, 1999: http://www.cubamar.cu/pesca/pesca.htm
949. Government sources announced a 1999 catch and aquaculture harvest of nearly 150,000 t in 1999. Cubamar, "La Pesca," internet posting accessed November 10, 2000: http://www2.cubamar.cu/ampp/lapesca.htm
950. Bustamante, *op. cit.*, August 7, 2001.
951. One observer reported dorado, snappers, shark, and swordfish as species which are available. Cosano Alén, *op. cit.*, November 10, 2000. The authors are doubtful, however, if swordfish is often available. The source may simply have named species that came to mind. Another source reports that consumers have to take what ever is available and that there is usually little choice. She reported barracuda in the market when she visited her mother in 2000. Nelia Carmenates, personal communications, January 2, 2001.
952. Cubamar, "Cuba y su industria pesquera," internet posting accessed December 28, 1999: http://www.cubamar.cu/pesca/pesca.htm
953. Cosano Alén, *op. cit.*, November 10, 2000.
954. Cosano Alén, *op. cit.*, November 10, 2000.
955. Indipes, "Commercialization of seafood products at special free stores all over the country," internet posting accessed December 28, 1999: http://www.sea-world.com/indipes/ipescade.htm
956. *Granma*, January 6, 1996.
957. It is still reportedly illegal for Cubans to fish from small boats if they plan to sell the catch. Several observers, however reported that a small number of private fishermen have been allowed to operate. Bustamante, *op. cit.*, August 7, 2001. One academic reports seeing private fishermen during a 1993 visit, Joyce, *op. cit.*, November 27, 2000. Another academic reported private fishermen hand lining in Havana during 2000. Anonymous, *op. cit.*, March 16, 2000. It is not clear to the authors if these fishermen are just tolerated or if they are licensed by MIP. We do not know how their catch is marketed. Notably none have outboard motors, but use oars and sails.
958. DeYoung, "Cuba climbs ...," *op. cit.*, p. A20 and John Stevely, Florida Sea Grant, personal communications, November 14, 2000.
959. Anonymous source, MIPES, May 21, 1995.
960. Myles, "Seafood smugglers face heavy fines," *op. cit.*
961. Reinaldo Cosano Allen, CubaNet, personal communications, November 10, 2000.
962. Fernandez Cuervo, *op. cit.*, February 23, 1982.
963. Fernandez Cuervo, *op. cit.*, February 23, 1982.
964. Orlando Rodriguez Romay, *Juventud Rebelde*, as cited in Fletcher, "Cuba hails ...," *op. cit.*

965. Cuban officials are hoping that Castro's developing personal relationship with Venezuelan President Hugo Chávez might eventually result in some deliveries of subsidized oil. The Venezuelans have donated oil to some Central American countries during 2000.
966. The author during a 1980 visited to Cuba ate in a Government cafeteria serving not very appetizing "escabezado" which was a kind of fish stew on rice. A Canadian researcher noted poor quality product being served in the mid-1990s. Joyce, *op. cit.*, November 27, 2000.
967. "Pescadores de la FAC producen más de un millon de pesos en divisas," *Mar y Pesca*, March 1978, p. 3.
968. The current official exchange rate is 21 pesos to the U.S. dollar. 1 million pesos would be less than $50,000, even at the unrealistic official rate.
969. This practice can complicate export statistics as the Cubans often add these domestic sales to their export statistics.
970. CEPEC, "Alimentos varios," internet site assessed November 20, 2000: http://www.infocex.cu/cepec/esp/productos/alimentos_varios.htm
971. Cubamar, "Cuba y su industria pesquera," internet posting accessed December 28, 1999: (http://www.cubamar.cu/pesca/pesca.htm). It is interesting to note that in Cuban Government press releases and internet postings that the graphics almost always show positive, upward trends. The authors notice that as of November 2000, that the Cuban Government has taken this site down and a new site makes no mention of such large export earnings. Cubamar, "La Pesca," internet posting accessed November 10, 2000: http://www2.cubamar.cu/anpp/lapesca.htm
972. Pascal Fletcher, "Cuba hails fish exports, but unpaid debts queried," CubaNet, March 4, 1998.
973. "Fishing industry income raise," *Cuban Economic News*, November 7, 1998.
974. "Tuna fishing in distant seas," *Bohemia*, January 18, 1974, pp. 22-29.
975. EU data with Spain included first becomes available in 1991.
976. The EU data for 1997 and 1998 is confirmed by unpublished data received from the Spanish Dirección General de Aduanas. The Spanish data note 108 t for 1997 only slightly different than the 109 t noted by the EU.
977. Central American countries (Belize, Honduras, and Panama) with Caribbean coasts do ship swordfish to Spain, but these are the countries registering flag-of-convenience vessels. The quantities involved are significant. In 1998 Spain imported the following quantity of swordfish from these countries: Belize (218 t), Honduras (339 t), and Panama (258 t). Spanish Dirección General de Aduanas, unpublished data. Virtually none of this fish was actually taken by the fishermen of these countries and probably little was actually taken in the Caribbean. Substantial quantities may have been transhipped through Port-of-Spain and Las Palmas as well as other Atlantic transshipment points. Nicaragua also shipped 3 t of swordfish to Spain in 1998, but this probably was taken by Nicaraguan fishermen, presumably in the Pacific.
978. The authors stress that the Japanese customs category includes a basket of both billfish as well as swordfish. The shipments from the different Caribbean islands probably include varying species mixes. It is unclear what the species mix is of the Cuban shipments to Japan.
979. Rodríguez, *op. cit.*, September 22, 2001.
980. Rodríguez, *op. cit.*, September 16, 2001.
981. Adams, "An overview ...," *op. cit.*
982. "Authorities create $3 million fishing enterprise," Evening Information Review newscast, Radio Havana, 0000 GMT, May 5, 1998.

SECTION XIII. (Government Policy)

983. Adams, Sánchez Vega, and García Alvarez, "An overview ...," *op. cit*, p. 6.
984. Adams, García Alvarez, and Sánchez Vega, "Recent changes ..., " *op. cit.*
985. Adams, Sánchez Vega, and García Alvarez, "An overview ..., *op. cit.*, p. 5.
986. See the discussion of these reforms and policy changes in "Overview".
987. Adams, Sánchez Vega, and García Alvarez, "An overview ..., *op. cit.*, p. 5.
988. A Cuban Government internet posting, for example, indicated, "Since 1997, all of the Fishing Associations closed their annual financial books with profits. Since 1998, all of the 360 State Economic Organizations which they make up were profitable. Cubamar, "La pesca," internet posting accessed November 10, 2000: http://www2.cubamar.cu/anpp/lapesca.htm
989. Adams, Sánchez Vega, and García Alvarez, "An overview ..., *op. cit.*, p. 7. Details on how the fuel utilization statistics were calculated are unavailable. As with much data available from Cuban sources, the claims of improved fuel efficiency are difficult to assess with out more details on just how the utilization data was

calculated. One basic question is whether the 0.9 t figure includes some of the old distant-water vessels that have now been retired from the fleet. If the Cubans are comparing the fuel utilization of the coastal fishery on the shelf, than this would be an important accomplishment.

990. Decree Law No. 1, February 24, 1977.

991. Decree Law No. 2, February 24, 1977.

992. U.S. Department of State, "U.S. commercial swordfish fishing off Cuba," message number 283757, November 7, 1978 and U.S. Department of State, "Commercial swordfish fishing by US vessels off Cuba," message number 17213, January 22, 1979.

993. Baisre, *op. cit.*, "Chronicle ...."

994. Rodríguez, *op. cit.*, September 13, 2001.

995. Lt. Ben Cooper, 7th District, U.S. Coast Guard, personal communications, March 1, 2000.

996. U.S. Embassy, Manila, "Bluefin tuna archival tag retrieval: Additional information," message number 14753, November 24, 1999.

997. Rodríguez, *op. cit.*, September 13, 2001.

998. A good recent overview of Cuban management is available in Claro, Baisre, and Garcia-Arteaga, "Management of fishery resources," *op. cit.*

999. Baisre, *op. cit.*, October 9, 2000. Officials report that the artisanal longliners are "low-productive" and very selective "so its use generally doesn't require additional fishing regulations. Claro, Baisre, and Garcia-Arteaga, "Management of fishery resources," *op. cit.*

1000. Claro, Baisre, and Garcia-Arteaga, "Management of fishery resources," *op. cit.*

1001. Adams, Sánchez Vega, García Alvarez, "An overview ...," *op. cit*, p. 7.

1002. Ministerio de Finanzas y Precios, Ley 73 del Sistema Tributario, August 4, 1994.

1003. A Pérez, *op. cit.*, August 14, 2001.

1004. Cubamar claims that as of 1997, all of the Associaciones Pesqueras reported profits. Cubamar, "La Pesca," *op. cit.*

1005. Claro, Baisre, and Garcia-Arteaga, "Management of fishery resources," *op. cit.*

1006. Adams, Sánchez Vega, García Alvarez, "An overview ...," *op. cit*, p. 7.

1007. The Japanese never served as vessel captains, but many Cuban longliners had Japanese fishing masters. Rodríguez, *op. cit.*, September 13, 2001. Soviet personnel played a similar role on Cuban trawlers.

1008. Cuban officials describe the Escuela Superior as a "colegio". This is used is the Latin American sense as a secondary school and not in the American sense as a university-level institution.

1009. Jorge Julio González, "Aulas para hombres del mar," *Mar y Pesca*, July 1983, number 214, pp. 34-37.

1010. Ubeda, "Tuna fishing ...," *op. cit.*

1011. Ubeda, "Tuna fishing ...," *op. cit.*

1012. Fidel Castro, November 16, 1971 as cited by Morales, "Una batalla ...," *op. cit*, p. 18. Cuban publications often contain articles about the school. Amaro Amare, "Donde los jóvenes se hacen marinos ...," *Mar y Pesca*, 1975.

1013. Pedro Morales, "Una batalla en las cuales para la victoria en el mar," *Mar y Pesca*, May 1979, number 164, pp. 14-19.

1014. Jorge Julio Gonzalez, "Un compromiso con el futuro," *Mar y Pesca*, October 1980, number 181, p. 5.

1015. FIS Europe, "AGECREW signs top contract," *op. cit.*

1016. "Cumplio la FAC su plan de captura del año," *Mar y Pesca*, December 1987, p. 3.

1017. See for example José Oro, Jr., *Cuba: Poisoning of Paradise. Environmental Pollution in the Republic of Cuba* (Cuban American National Foundation: Miami, June 1992), 134p.

1018. The dams serve a variety of purposes including flood protection, irrigation and hydro-electric production. The reservoirs created behind the dams have been used to increase production of freshwater fish. The authors have even noted Fidel Castro commenting on fish production in these reservoirs. He indicated production was 20,000 t in 1990 which was to be increased to 40,000 t in 1992. *Granma Weekly Review*, cited in *Seafood International*, January 1991. Castro's projection, however, proved overly optimistic (appendix C1a2b2).

1019. Manuel David Orrio, "Cuban shrimp in danger," *Cuba Net*, February 27, 1997.

1020. Manuel David Orrio, "Cuban shrimp in danger," *CubaNet*, February 27, 1997 and Andres Pérez, personal communications, August 14, 2001.

1021. A. Pérez, *op. cit.*, August 14, 2001.

1022. Joyce, "Socialism and the fishery ...," *op. cit.*, pp. 53-69, A. Pérez, *op. cit.*, August 14, 2001, and Orrio, "Cuban shrimp in danger," *op. cit.*.

1023. Carlos Wotzkow, "Cuba: S.S.S. por su naturaleza," *Encuentro de la Cultura Cubana*, Spring-Summer, 1988, N°8/9, pp. 16-23.
1024. Gordon, "Cuba's entrepreneurial socialism," *op. cit.*
1025. An example of one such study is an assessment of the Archipelago Sabana-Camaguey. It was conducted primarily by the Instituto de Oceanología, the Instituto de Ecología y Sistemática, and the Instituto de Geografía. Other agencies like the CIP also participated. For details see Pedro M. Alcolado, Leda Menéndez, Antonio Magáz, "Interdisciplinary environmental assessment of the Archipelago Sabana-Camaguey (Cuba), prior to extensive tourist development projects," in "Coastal systems studies and sustainable development," *UNESCO Technical Papers in Marine Science*, No. 64 (UNESCO, 1992), pp. 125-131.
1026. A. Pérez, *op. cit.*, August 14, 2001. This presumably reflects the increasing institutional strength of both the CIP and MIP as a new generation of competent, well trained researchers and managers are reaching positions of authority.
1027. Fernandez Cuervo, *op. cit.*, February 23, 1982.
1028. Pérez with Rae, "Collapse ...," *op. cit.*
1029. As with many issues associated with Cuba, there are widely differing views. The authors have noted a variety of reports describing serious environmental problems in Cuba. See for example Oro, *Cuba: Poisoning of Paradise, op. cit.*, 134p. Cuban environmental problems do not, however, appear as severe as in Eastern Europe, perhaps because of the less extensive industrial development in Cuba. Coastal areas in particular are not as developed in Cuba as in many other Caribbean countries, in part because of the country's inefficient economy and, until recently, lack of interest in tourist development. Other observers report that the country's development strategy places strict environmental controls on development. Foreign investment projects must include provisions for waste disposal and land use consistent with sustainable development. Gordon, "Cuba's entrepreneurial socialism," *op. cit.* One perceptive study attempting to assess the advantages and disadvantages of Cuba's communist system on fisheries management and environmental protection is Joyce, "Socialism and the fishery ...," *op. cit.*, pp. 53-69.
1030. Armando Pérez, a former CIP researcher, has authored a paper addressing how Cuba is confronting environmental issues, but it has not yet been published.
1031. Claro, Baisre, and Garcia-Arteaga, "Management of fishery resources," *op. cit.*
1032. A. Pérez, *op. cit.*, August 14, 2001. Pérez was a principal CIP researcher at the CIP working on shrimp management.
1033. Wotzkow, "Cuba: S.O.S. ...," *op. cit.*
1034. A good reflection of this is the Scientific Forums held by the CIP. At the Third Forum held in 1981, for example, 53 papers were presented covering research on snappers, lobsters, mussels, clams, and other coastal fisheries as well as papers on other topics such as oceanography and fishing gear and methods used in the coastal fishery. There were, however, a few papers on distant-water fisheries off Canada and South America. One paper dealt with the coastal skipjack fishery as well as one paper on the tuna longline fishery in Cuban waters: A. Rodríguez, "Perspective of the tuna longline fishermen on the central waters of the Cuban ZEP zone."
1035. The main authors of these reports were S. Moreno, L. Muñoz, J. Pol, A. Rodriguez and, S. Valle, but others were also involved. Their papers are listed in the "Sources" section.
1036. See for example S. Valle, N. Mezentseva, and A. Rodríguez, "Nota sobre el contenido estomacal del atún ojo grande (*Thunnus obesus*) en el Atlántico centro orinental," *ICCAT Collective Volume of Scientific Papers*, Vol. 9, no. 2 (ICCAT: Madrid, 1980), pp. 282-286.
1037. A. Pérez, *op. cit.*, August 14, 2001.

SECTION XIV. (Research)

1038. Before the desolation of the Soviet Union, collaboration between Cuba and Russia research could be conducted with little hard currency. Now that hard currency is required, such collaboration is much more difficult.
1039. See for example, Dragovich. "Trip report ..., " *op. cit.*
1040. Castro, *op. cit.*, July 1, 1999.
1041. Claro, *op. cit.*, January 29, 2001.
1042. Claro, *op. cit.*, January 29, 2001.
1043. The authors have exchanged e-mails with some Cuban researchers who have individual e-mail addresses. Efforts to send e-mails to a centralized institute address routinely are unsuccessful.

1044. See for example, "Cuban company cuts most phone service with United States," *Time Herald-Record* , February 26, 1999. The telephone disputes between the United States and Cuba as with most aspects of the relationship are too complicated to discuss here. They have added, however, to the difficulties in communications between the two countries.
1045. Bane, "Background information ...," *op. cit.*
1046. Guillermo Garcia Montero, "5th Congress on Marine Science: MarCuba'2000," internet site accessed January 30, 2001: http://ioc.unesco.org/iocweb/news/external/marcuba2000_e.htm
1047. Adela Prieto, Director, Centro de Investigaciones Pesqueras, personal communications, January 29, 2001.
1048. A. Mena Millar and M. Nikolic, "Evaluación de los programas multilaterales en el campo de la investigación de recursos pesqueros en Cuba," in "Report of the Working Party on the Promotion of Fishery Resources Research in Developing Countries," *FAO Fisheries Report*, No. 251 (FAO: Rome, 1982), p. 190.
1049. An example of assessments prepared by visiting NMFS researchers is a trip report prepared by a fisheries biologist from the NMFS Southeast Fisheries Research Center (F/SEC). He writes, "Judging from the list of the presented papers and from the lists and from the reports that I heard and from my discussions with the project leaders (and I met a large number of them), I must say the biologists of CIP are engaged in meaningful research on the resident shelf biota and their ecology. The presentations were also very good and the scientific enthusiasm was there. Alexander Dragovich, "Trip report--CIP meeting in Cuba--October 23-27, 1981," November 10, 1981.
1050. Millar and Nikolic, "Evaluación de los programas ...," *op. cit.*, p. 188.
1051. Millar and Nikolic, "Evaluación de los programas ...," *op. cit.*, p. 188.
1052. Brian Kemp, "UNBSJ off to Cuba to study seas," *Times Globe*, November 19, 1996.
1053. Millar and Nikolic, "Evaluación de los programas ...," *op. cit.*, p. 191.
1054. Kemp, "UNBSJ off to Cuba ...," *op. cit.*, November 19, 1996.
1055. Millar and Nikolic, "Evaluación de los programas ...," *op. cit.*, p. 189.
1056. Jeff Stann, AAAS-Western Hemisphere Project, as quoted in Karen Young Kreeger, "Tied up in red tape," *The Scientist*, April 15, 1996.
1057. Rodríguez, *op. cit.*, September 16, 2001.
1058. Joyce, *op. cit.*, November 27, 2000.
1059. Claro, *op. cit.*, January 29, 2001.
1060. "Publishing was always a problem in Cuba, but more acutely starting in the late 1980s there were problems with publishing papers. I was a member of the Editorial Council of the Revista Cubana de Investigaciones Pesqueras and I remember the long waiting line of papers that could not be published for lack of paper for the magazine and space in the publication although I am sure that scientific production greatly diminished in the crisis of the 1990s. A. Pérez, *op. cit.*, August 28, 2001.
1061. Rodríguez, *op. cit.*, September 16, 2001.
1062. Marris, "Cuba. Que pasa?" *op. cit.*, p. 92.
1063. Claro, *op. cit.*, January 29, 2001.
1064. Ault, *op. cit.*, March 30, 2000.
1065. Muñoz, *op. cit.*, August 14, 2001 and Rodríguez, *op. cit.*, September 16, 2001.
1066. A. Pérez with D. Rae, "Collapse ...," *op. cit.*
1067. Some of these studies reported on scientific research. See for example, Valle, Mezentseva, and Rodríguez, "Nota sobre ...," *op. cit.*, pp. 282-286; A. Rodríguez, S. Valle, and R. Valdés, "Composición por largo y proporción entre los sexos del atún aleta amarilla (*Thunnus albacares*) en el Atlántico centro-oriental," *ICCAT Collective Volume of Scientific Papers* (SCRS/79/29) Vol. IX no. 1 (ICCAT: Madrid, 1980), pp. 143-151; Valle and Rodríguez, "Intensidad total ...," *op. cit.*, pp. 46-49; Valle and Rodríguez, "Analisis de cohortes de la pesqueria del atún grande (*Thunnus obesus*) en el Oceano Atlantíco," *op. cit.*, pp. 317-322. Other reports described the Cuban tuna fisheries. See for example, Rodríguez, "Una revision ...," *op. cit.* Many other reports published by ICCAT are listed in the under "Sources".
1068. The authors have noted quite a number of reports that were published in Cuba, but that proved difficult to obtain from U.S. libraries. Andres Rodríguez has compiled an impressive list of these reports, focusing primarily on the fishery around Cuba itself, which would be available to researchers working in Cuba. Rodríguez, "Una revision ...," *op. cit.*, pp. 467-469.
1069. Muñoz, *op. cit.* August 14, 2001.
1070. Pérez, *op. cit.*, August 14, 2001.
1071. Rodríguez, *op. cit.*, August 17, 2001.
1072. Rodríguez, *op. cit.*, August 17, 2001.
1073. A. Pérez, *op. cit.*, August 14, 2001.

1074. One Cuban researcher reports, "As far as I know, the CIP, the UH, and the Academy of Sciences have some old fashion archiving facilities that keep some of the unpublished reports, but at least in the case of the CIP, most of the information is gathering dust and sometimes just remains in the office of the biologist involved with the given project for ages without being placed anywhere to be preserved. There is nothing like a policy concerning databases that would guarantee that all the data collected for years is kept in a certain place and many of the management reports are kept only by the biologist who produced them, if at all. It might have all changed for the better after I left the CIP in 1993, but I very much doubt it." A. Pérez, *op. cit.*, August 30, 2001.
1075. See for example, S. Valle and A. Rodríguez, "Analisis de cohortes de la pesqueria del atún grande (*Thunnus obesus*) en el Oceano Atlantíco," *ICCAT Collective Volume of Scientific Papers* (SCRS/79/33) Vol. 9, no. 2 (ICCAT: Madrid, 1980), pp. 317-322.
1076. A. Pérez, *op. cit.*. August 14, 2001.
1077. Rodríguez, Nieto, and Castro, "Aspectos comparativos ...," *op. cit.*, p. 175.
1078. A. Pérez, *op. cit.*, August 14, 2001.
1079. Rodríguez, *op. cit.*, September 22, 2001.
1080. Rodríguez, *op. cit.*, September 22, 2001.
1081. This researcher was speaking of turtle tags, but MIP may have had the same policy for fish. Moncada, *op. cit.,* May 6, 2001.
1082. Moreno, "National report of Cuba," 1986-87 *op. cit.*, p. 268.
1083. Maria Elena Ibarra Martin, Jorge Angulo Valdés, Georgina Espinoza López, Johan Pacheco Roberto, Félix Moncada Gavilán, Gonzalo Nodarse Andreu, and Erick Escobar González, "University project on the study and conservation of Cuban sea turtles," *Marine Turtle Newsletter*, No. 84, April, 1999, pp. 11-12.
1084. Ramis Ramos, "Mejoras en el mantenimiento ...." *op. cit.*, p. 4.
1085. INP, *La Industria Pesquera en Cuba, op. cit.*, p. 24.
1086. Valerian Yurov and Héctor Ramis Ramos, "Oceanographic investigations applied to the tuna fishing in the Caribbean Sea," in *Symposium on Investigations and Resources of the Caribbean Sea and Adjacent Regions* No. 4.7 (FAO: Rome, 1969).
1087. See for example: C.A. Carles and H. Ramis, "Experiencias con los tanques de acoplo para carnadas vivas en Cuba," *Rev. Cubana Invest. Pesq.*, Vol. VIII, No. 3, 1983, pp. 46-63; S.V. Valli, "Estado actual de la pesquería Cubana de listado (*Katsuwonus pelamis*) y atún aleta negra (*Thunnus atlanticus*), *Collected Volume of Scientific Papers*, Vol. 30, No. 1, (ICCAT: Spain, 1989), pp. 56-67; C.A. Carles Martín, "Composición por especies de las capturas de tunidos con vara en Cuba," *Collected Volume of Scientific Papers*, SCRS 91/61, Vol. 39, No. 1, (ICCAT: Spain, 1992), pp. 39-45; C.A. Carles and S.V. Valle, "Estimación preliminar de la abundancia relativa de la pesqueria de listado (*Katsuwonus pelamis*) y atún aleta negra (*Thunnus atlanticus*) en la zona noroccidental de Cuba," *Collected Volume of Scientific Papers*, SCRS 91/31, Vol. 39, No. 1, (ICCAT: Spain, 1992), pp. 1-11; S.V. Valle Gómez, "Caracterización de los cardumenes de listado (*Katsuwonus pelamis*) y atún aleta negra (*Thunnus atlanticus*) en aguas, de Cuba," *Collected Volume of Scientific Papers*, SCRS 91/32, Vol. 39, No. 1, (ICCAT: Spain, 1992), pp. 12-26; and Norma Ramírez Ballesta and Eduardo Rodríguez González, "El medio y su influencia en la abundancia del bonito (*Katsuwonus pelamis*) y la albacora (*Thunnus atlanticus*) en Cuba," *Jaina*, January-March, 1992, p. 13.
1088. Morena and Rodriguez, "Cuban tuna fisheries ...," *op. cit.*, pp. 234-235.
1089. "Accomplishments in 1979, 1980, and 1981," *Fisheries*, July-August, 1982, p. 16.
1090. CIP biologist Jose Suárez provided specimens and cooperated with a major U.S. assessment of larval swordfish published in 1954. Arata, "A contribution to the life history ...," *op. cit.*
1091. S. Valle, N. Mesenteva, and A Rodríguez, "Nota sobre el contenido del atún ojo grande (*Thunnus obesus*) en el Atlántico centro oriental," October 1978 (unpublished paper forwarded by FAC); S. Valle and A. Rodríguez, "Análisis de cohortes de la pesquería del atún ojo grande (*Thunnus obesus*) en el Océano Atlántico," 1978 (unpublished paper forwarded by FAC); and S. Valle and A. Rodríguez, "Intensidad total de pesqueria con palangre de Cuba para el atún aleta amarilla (*Thunnus albacares*) en el Oceano Atlántico, 1973-1977," *Collective Volume of Scientific Papers* Vol. IX, 1979, (SCRS/79/30), pp. 46-49.
1092. See for example: Sokolov and Ramos, "Distribución de los atunes ...," *op. cit.*; Zharov, "Resultado de los ...," *op. cit.*; and Sokolov, "Investigaciones sobre el atún ..., *op. cit.*
1093. M. del P. Frías, G. Delgado, C. Alvarez, and N. Fernádez, "Distribución y abundancia larvaria de las especies *Katsuwonus pelamis* y *Thunnus atlanticus*: pisces: Scombridae, en la Z.E.E. de Cuba," *Revista Cubana de Investigaciones Pesquera*, Vol. 18, No. 2, 1993-94, pp. 44-49; N. Ramírez, "Relación de la presión atmosférica con los rendimientos de bonito (*Katsuwonus pelamis*) en la región norcentral de Cuba," *Revista Cubana de Investigaciones Pesquera*, Vol. 18, No. 2, 1993-94, pp. 6-9; and C.A. Carles and A. Vivero, "Experiencias con

los dispositivos artificiales para la pesca de bonito en la zona noroccidental de Cuba (1ra etapa)," *Revista Cubana de Investigaciones Pesquera*, Vol. 18, No. 2, 1993-94, pp. 1-5.
1094. Hectór Ramis Ramos, "Principales métodos de pesca del atún," *Contribuciones: Instituto Nacional de la Pesca Cuba/Centro de Investigaciones Pesqueras,* (Investigaciones Atuneras Cubano-Soviéticas), October, 1967, Nos. 23-26, combined issue, pp. 3-28.
1095. C.A. Charles, A Cárdenas, and R. Alpízar, "Mejoras en el mantenimiento de la carnada viva para la pesquería de túnidos con vara en Cuba," *Revista de Investigaciones Pesqueras*, 1991, Vol. 16, No. 3-4, pp. 40-48.
1096. See for example: Moreno, Pol, and Muñoz, "Influencia de la luna ..., *op. cit.,* p. 508-510 and Muñoz, Moreno, Rodríguez, and Pol, "Características bilógico-pesqueras ...," *op. cit.*, pp. 44-56..
1097. Ibarra Martin, *et. al.*, "University project ...," *op. cit.*, pp. 11-12.
1098. CIP, "Programa de investigaciones," internet posting accessed December 28, 1999: http://www.sea-world.com/centro/programas.htm
1099. E. Giménez, R. Tizol, and M.L. Hernández, "Uso y distribución de los arrecifes artificiales en Cuba," Archivo Centro de Investigaciones de Cuba, 1986, 12p.
1100. This referred specifically to the shrimp fishery, but the same can be said for many other fisheries. A. Pérez with D. Rae, "Collapse ...," *op. cit.*
1101. Muñoz, Moreno, Rodríguez, and Pol, "Características bilógico-pesqueras ...," *op. cit.*, pp. 44-56.
1102. Suárez Caabro and Duarte Bello, "Biologia pesquera del bonito ...," *op. cit.*
1103. Claro, *op. cit.*, January 28, 2001.
1104. See, for example, V.L. Zharov, "Investigaciones atuneras Cubano-Soviética, *Contribuciones del INP*, Nos. 23-26, October, 1967.
1105. Carlos A Carles Martín, "Características biológico-pesqueras del bonito (*Katsuwonus pelamis*) y de la albacora (*Thunnus atlanticus*) en la costa nororiental de Cuba," *Contribution*, No. 32, 1971, 51 p. More recent studies on these species were reported in 1980, although the institute responsible was not indicated. "Investigación sobre el bonito, " *Mar y Pesca*, August, 1989, p. 41.
1106. Cuba's noted researcher on oceanic pelagics, Dario Guitart Manday, worked in the IO. His study on swordfish (1964), sharks (1975), and billfish (1981) off Cuba's northeast coast are some of the most informative published in Cuba. (See "Sources".) Guitart also published a paper in 1971 which the authors have been unable to obtain.
1107. Roldofo Claro, (ed.) *Ecología de Los Peces Marinos de Cuba* (Instituto de Oceanologia and Centro de Investigaciones Pesqueras de Quintana Roo: Mexico, 1994), 525p. and Roldofo Claro, K.C. Lindeman, and L. Parenti (eds.), *Ecology of the Marine Fishes of Cuba* (Smithsonian Press, in press).
1108. Claro, *op. cit.*, January 29, 2001.
1109. D. Guitart-Manday, *Sinopsis de los Peces Marinos de Cuba*, (Instituto de Oceanología/Academia de Ciencias de Cuba, 1974-78), 4 volumes, 881p.
1110. A. Silva Lee, "Observaciones sobre arrecifes artificiales usados para pescar en Cuba," *Acad. Cien. Cuba Ser. Oceanol.*, No. 26, 1975, pp. 1-13 and R. Claro and J.P. García-Arteaga, Perspectives on an artificial habitat program for fishes of the Cuban shelf," (translated by G. Bustamente and K.C. Lindeman) , Florida Sea Grant Program, University of Florida, 1999, SGEB-49, 38p.
1111. Greg McIntosh, McIntosh Marine, personal communications, November 28, 2000.
1112. García Alvarez, *op. cit.*, April 1, 1998.
1113. Guitart, "Biología pesquera del emperador ...," *op. cit.*, pp. 19-20. Also see Moreno, Pol, Muñoz, "Influencia de la luna ...," *op. cit.* pp. 508-510.
1114. See for example: Moreno, Pol, and Muñoz, "Influencia de la luna ..., *op. cit.,* p. 508-510 and Muñoz, Moreno, Rodríguez, and Pol, "Características biológico-pesqueras ...," *op. cit.*, pp. 44-56..
1115. Zharov, "Resultado de los ...," *op. cit.*, p. 53 and Sokolov, "Investigaciones sobre ...," *op. cit.*, p.63.
1116. Sokolov, "Investigaciones sobre ...", *op. cit.*, pp. 63-80.
1117. Caribbean Acoustic Network, "RAC-General information," internet site accessed November 20, 2000: http://www.icm.csic.es/rec/gim/rac/rac_gen.html
1118. Buesa, "Fishing grounds ...," *op. cit.*
1119. FAO, "Mejora de la pesca de atún con palangre," *Informe*, N°AT2987, (Rome: UNDP, 1971), 12p.
1120. Wataru Ichikawa, "Informe al gobierno de Cuba sobre mejora e incremento de la pesca de atún con palangre," *Informe FAO*, No. FAO/PNUD(AY) No. 2987 (FAO: Rome, 1971), 12p.
1121. Tim Askew, Harbor Branch Oceanographic Institution, personal communications, February 1, 2001.
1122. ICCAT, "Report of the Standing Committee on Research and Statistics," *ICCAT Report* Part II, 1985 (ICCAT: Madrid, Spain, 1986), p. 105.

1123. Moreno, "National report of Cuba," 1986-87 *op. cit.*, p. 268.
1124. Sokolov and Ramis Ramos, "Distribución de los atunes ...," *op. cit.*, pp. 29-52.
1125. A. Rodríguez and P. Castro, "Comparación de las técnicas ...," *op. cit.*, p. 16.
1126. Gilbert W. Bane, *Background Information for a Cuban-American Cooperative Fisheries Program*, LSU-CFI-85-17 (Coastal Fisheries Institute: Baton Rouge, 1985), p. 1.
1127. U.S. Department of State, "US-Cuba fisheries research coordination meeting," message number 225540, August 24, 1981.
1128. NOAA Office of Marine and Aviation Operations, "NOAA ship *Oregon II*: November's featured platform," internet posting retrieved March 8, 2000: http://www.nc.noaa.gov/nov1998.html.
1129. A detailed cruise report has been issued NMFS Southeast Fisheries Science Center, "NOAA Ship *Oregon II* Cuise OT-98-02 (231) 07/24-09/22/98," *Cruise Results: Coastal Shark Assessment* (NMFS Pascagoula Facility: Pascagoula, Mississippi, January 8, 1999).
1130. NOAA ship Oregon II, "Operating schedule," internet posting retrieved: http://www.pmc.noaa.gov/schedule/ot.htm and Mark Grace, NMFS, personal communications, December 18, 2000 and January 23, 2001.
1131. Donald L. Hammond, "Temporal-spatial occurrence of Istiophorids off South Carolina as shown by recreational capture data, 1977 to 1997," *Proceedings of the Gulf and Caribbean Fisheries Institute, 1998*, vol. 51.
1132. Buesa, "Fishing zones ...," *op. cit.*
1133. See for example Charles M. Adams, Sherry Larkin, and Donna Lee, "Catch, costs, and returns of the Atlantic pelagic longline fleet in 1996," paper presented at the American Fisheries Society Annual Meeting, 1999, Charlotte, North Carolina, September 1, 1999.
1134. Anonymous Cuban source, personal communications, March 2, 2000.
1135. The UM research program was led by Don de Sylva who worked with Dr. Bill Richards (NMFS) and Dr. Nagasawi.
1136. Jerole Ault, University of Miami, personal communications, March 30, 2000.
1137. Ault, *op. cit.*, March 30, 2000.
1138. While the title of this article stresses sailfish, the researchers involved have also focussed on swordfish. J.S. Ault, T.R. Capo, J. Luo, S.A. Luthy, J.E. Serafy, P.W. Walsh, and D. de Sylva, "Assessing sailfish populations in the Straits of Florida," *Proceedings of the Gulf and Caribbean Fisheries Institute, 1998*, vol. 51.
1139. Tom Capo, University of Miami, personal communications, March 29, 2000 and Ault, *op. cit.*, March 30, 2000.

SECTION XV. (Bycatch)

1140. The authors are constantly amazed as to how the seemingly simplest question concerning Cuba can give rise to the most complicated discussions. Several individuals knowledgeable about Cuba also tell the authors that they know of no independent NGOs of any importance. Fraser, *op. cit.*, August 2, 2001; James Peran Ross, Crocodile Specialist Group, personal communications, August 2, 2001; and Anonymous U.S. environmentalist, personal communications, August 6, 2001. As with many of the issues examined in this report associated with Cuba, nothing is quite so simple. While independent environmental NGOs of any importance do not exist in Cuba, there are some small groups. Such groups have to be registered and be associated with an appropriate ministry. This of course means that they are not truly independent groups. Georgina Bustamante, personal communications, August 7, 2001. Another observer mentions largely academic and professional groups like the Cuban Zoological Association and the Cuban Biological Association. Alejandro Grajal, Audubon Society, personal communications, August 7, 2001. The membership of academic an professional groups like the Zoological and Biological Associations are made up of government employees. All educational institutions in Cuba are state facilities and virtually all professionals work for state agencies. Thus the authors would hesitate to call these organizations NGOs in the sense that the term is used in the United States. This does not mean that there is not some level of citizen debate on environmental issues. The issue of development of beach areas around Varadero and other north coast areas has arisen, for example, at the municipal government level. Grajal, *op. cit.*, August 7, 2001. Such issues in Cuba are usually settled in a less confrontational manner with an attempt to reach consensus among local government and government agencies. Grajal, *op. cit.*, August 7, 2001. It is also true that the debate is much less public and once decisions are made, citizens do not have the right to organize in an effort to reverse such decisions. The issue is further complicated by the fact that while individual Cuban citizens are for all practical purposes not allowed to form NGOs, international NGO groups are allowed to work in Cuba. Such NGOs are permitted by the Cuban Government because they bring both expertise and funds. There are quite a number of environmental projects active in Cuba

and international NGOs play an important role in Cuban conservation efforts. Some report that as long as they go through the proper channels and work with Cuban officials and academics that they have had good cooperation. Ross, for example, finds that working with Cuban agencies is no worse than working with NOAA in the United States. Ross, *op. cit.,* August 2, 2001. Other NGO workers have had a more difficult experience, but have asked not to be identified as they still hope to work in Cuba. Some NGO workers are in fact quite critical of the Cuban Government. While they often speak highly of individual Cuban researchers, they claim that researchers such as those involved with sea turtles, are required to adhere to Government policy and are not allowed to question it publicly. This is not dissimilar from government researchers in many other countries, but in Cuba virtually all researchers are government employees. One environmentalist stresses that Cuban NGOs while not independent are not unimportant. They are in fact made up of highly qualified professionals that are consulted by the Government agencies. Bustamante, *op. cit.*, August 10, 2001. These groups do not, however, have independence to do work like their colleagues in other countries. They cannot work abroad, obtain funding for salary or activities, or implement projects with foreign groups without Government authorization. They have to rely upon the associated Government agency for support which complicates the simplest activity such as phone service. These Cuban NGOs find it difficult, if no impossible, to obtain internet access or long distance phone service as this requires payment in dollars. Anonymous U.S. environmentalist, personal communications, August 6, 2001.

1141. A Cuban naturalist, Orlando Polo, tried to organize a group called Vida (Life) in 1989. "Detienen nuevamente en Cuba al responsable de la Asociación "Vida" Orlando Polo," *Diario las Americas*, September 27, 1989.

1142. Rodríguez, *op. cit.*, September 13, 2001.

1143. Rodríguez, *op. cit.*, September 16, 2001.

1144. Dr. Rodríguez informs the author that considerable information is included in one of his unpublished studies. Unfortunately, the publication schedule for this book did not give the authors the opportunity to consult it. An abstract is available in A. Rodríguez, S. Moreno, and J. Pol, "Eficiencia pesquera ...," *op. cit.*, p. 16.

1145. Olaechea, "Ordenamiento de las pesquerías ...," *op. cit.*

1146. Guitart Manday, "La pesquerías pelágico-oceanicas ...," *op. cit.*, p.4.

1147. Espinoza, Sosa, Moreno, and Quevedo, "Aspectos biologicos ...," *op. cit.,* pp. 266-286.

1148. Rodríguez, Moreno and Pol, "Eficiencia pesquera ...," *op. cit.*, p. 8. The authors can not present the actual data as we could not obtain a copy of the paper.

1149. Rodríguez, Nieto, and Castro, "Aspectos comparativos ...," *op. cit.*, p. 175.

1150. FAC reported that swordfish was 24 percent of "the total of tunas fished" ("el total de tunidos pescados"). The authors are not positive as to how to interpret this as swordfish obviously is not a tuna. We believe that *Mar y Pesca* is using "tunas" to mean tunas, swordfish, and billfish combined. We are not sure if they are also including bycatches species such as shark, oilfish, and others which may be retained. "Cumplio la FAC su plan de captura del año," *Mar y Pesca*, December 1987, p. 3.

1151. The principal problem is that some species are taken in other fisheries than the commercial longline fishery. Sharks are the principal species at issue here and it is not precisely clear in which fishery Cuba's shark catch is taken.

1152. Some comparative data confirm that in the absence of local data that the U.S. data may be a useful guide (appendix C11e).

1153. U.S. Caribbean bycatch data is summarized in the Puerto Rican chapter of this report.

1154. These countries have not reported in detail on the species composition of their shark bycatch. One exception is the reporting required of the Japanese when operating in U.S. and Canadian waters. NMFS personnel working on sharks, however, have noted a few preliminary papers in recent years with some shark species data. There may be data on other species as well. John Hoey, NMFS, personal communications, August 3, 2001. An example of one of these papers is Valentín Buencuerpo, Santiago Ríos, and Julio Morón, Pelagic sharks associated with the swordfish, *Xiphias gladius,* fishery in the North Atlantic Ocean and the Strait of Gibraltar," *Fisheries Bulletin*, 1998, Vol. 96, pp. 667-685.

1155. These trends are discussed in "Overview: Fishing Industry".

1156. The species mix has changed over time. Currently skipjack and blackfin (*Thunnus atlanticus*) are the two most important species. Claro, Baisre, and Garcia-Arteaga, "Management of fishery resources," *op. cit.* In some past years Atlantic black skipjack (*Euthynnus alletteratus*) has also been important.

1157. Bigeye is not an easy species to identify. Juvenile bigeye and yellowfin are quite similar and the two are often confused.

1158. It is extremely difficult to describe a Cuban company's earnings, especially in the period before the economic reforms of the 1990s. Cuban companies did not have to cover their expenses, let alone make a profit. Exchanges between companies, such as purchasing supplies or delivering fish were handled by rudimentary accounting transfers if at all. Only when foreign currency was needed was the accounting more involved. Thus in Cuban terms, hard currency earnings were a very important part of a company's operations.
1159. Other tunas such as skipjack, black skipjack, and blackfin are taken in Cuban coastal waters by baitboats and supplied to domestic canneries.
1160. Data on the catch of yellowfin and other species is available on the ICCAT website: http://www.iccat/es/Stats.html
1161. Rodríguez, Nieto, and Castro, "Aspectos comparativos ..., " *op. cit.*, p. 171.
1162. A Bermudian company leasing a Cuban longliner reports that the captain insisted on landing large numbers of sharks. See "International: Joint ventures" for details.
1163. Rodríguez, *op. cit.*, September 16, 2001.
1164. Rodríguez, Nieto, and Castro, "Aspectos comparativos ..., " *op. cit.*, pp. 173 and 175.
1165. Curiously, most of the tuna catch reported was bluefin. FAO, "Mejora e incremento de la pesca de atun con palangre: Informe al gobierno de Cuba," *Informes*, No. 2987 (FAO: Rome, 1971), p. 9.
1166. See for example Guitart Manday, "Las pesquerías pelágico-oceánicas ...," *op. cit.*
1167. Rodríguez, *op. cit.*, September 16, 2001.
1168. Ubeda, "Tuna in the Caribbean," *op. cit.*
1169. The best description of the Cuban tuna operations in their EEZ is A. Rodríguez, Pedro Castro, S. Nieto, and Luis Muñoz, "Pesquerias de atunes en la zona economica Cubana, 1981-86," *Mar Cuba 87.* One of the authors reports that the article was in press when he left Cuba, but has never seen the published copy of the report.
1170. Olaechea, "Ordenamiento de las pesquerías ...," *op. cit.*
1171. Claro, Baisre, and Garcia-Arteaga, "Management of fishery resources," *op. cit.*
1172. Cuban researchers believe that the populations of many large pelagics are inter-related and that a decline or increase in one species will affect other species, especially species occupying the same are related biological niches. Rodríguez, Nieto, and Muñoz, "Análisis de la abundancia ...," *op. cit.*
1173. The Soviet Union was dissolved at the end of 1991 and with it Soviet subsidized oil deliveries. Well before 1992, however, the Soviets were not fully meeting their oil commitments to the Cubans. Several factors were involved here. The Soviet oil industry was having a hard time meeting their own domestic energy needs. As Cuba was shielded by the rises in energy prices since the 1970s, the country had not taken the steps toward energy efficiency that had been forced upon many other countries. In addition, the cost of oil by the 1980s had risen to levels that made oil exports a major economic support for the struggling Soviet economy. Soviet planners were increasingly aware of the real economic costs of the oil subsidy to Cuba.
1174. Olaechea, "Ordenamiento de las pesquerías ...," *op. cit.*
1175. The authors have primarily used Cuban data submitted to ICCAT and FAO in this report. A recent report prepared by Cuban authors uses somewhat different data. Claro, Baisre, and Garcia-Arteaga, "Management of fishery resources," *op. cit.* We are unsure about the differences in the data, but it may be that the Cubans are just using the billfish catch in their coastal waters.
1176. The Cuban data available through ICCAT (appendix C8f) does not show swordfish catches off Cuba's northwestern coast, suggesting that the Cubans may have only provided data on their commercial fishery to ICCAT. FAO does, however, receive the artisanal catch data from the Cubans.
1177. Guitart Manday, "Las pesquerías pelágico-oceánicas ...," *op. cit.*, p. 25.
1178. See for example Guitart Manday, "Las pesquerias pelágico-oceánicas ...," *op. cit.*, pp. 24-25.
1179. Guitart Manday, "Biología pesquera del emperador ...," *op. cit.*, p. 25.
1180. See for example Guitart Manday, "Las pesquerias pelágico-oceánicas ...," *op. cit.*, pp. 24-25.
1181. See for example Guitart Manday, "Las pesquerias pelágico-oceánicas ...," *op. cit.*, pp. 23-25.
1182. Guitart, Juárez, and Milera, "Análisis de las pesquerías deportivas ...," *op. cit.*, p. 138.
1183. See for example Guitart Manday, "Las pesquerias pelágico-oceánicas ...," *op. cit.*, p.23. The author in this detailed discussion of the artisanal fishery discusses swordfish, sharks, and billfish, but does not mention tunas.
1184. Low or null catches is not absolute proof that the fish are not present, but with a heavily fished stock it is a strong indicator that they are not present.
1185. Rodríguez, Nieto, Muñoz, "Análisis de la abundancia ...," *op. cit.*
1186. Cosano Alén, *op. cit*, November 10, 2000.

1187. See for example: S.R. Bonfil, "Composición por especies de la pesquería de tiburón y cazón en Yucatán y relaciones morfométricas para las principales especies," *Documento Técnico* (Instituto Nacional de Pesca: Yucalpeten, Yucatan, 1987), pp. 1-10 and S. Branstetter, "Biological notes on the sharks of the north central Gulf of Mexico, *Cont. Mar. Sci.*, Vol. 24, pp. 13-34.
1188. Martinez, "The Cuban shark industry," *op. cit.*
1189. Mark Grace, NMFS, personal communications, March 9, 2000. Dr. Grace is the Chief Scientist for the cooperative shark work conducted aboard the *Oregon II* in 1998.
1190. José I. Castro, Christina M. Woodley, and Rebecca L. Brudek, "A preliminary evaluation of the status of shark species," *FAO Technical Paper*, No. 380 (FAO: Rome, 1999), pp. 50-51.
1191. Guitart in his 1975 study focused almost entirely on shark. Guitart Manday, "Las pesquerías pelágico-oceánicas ...," *op. cit.*
1192. Guitart Manday, "Las pesquerías pelágico-oceánicas ...," *op. cit.*, p. 5.
1193. Pol, Muñoz, Moreno, and Rodríguez, "Evolución de la abundancia ...," *op. cit.*, pp. 44-45.
1194. Moreno and Pol, "Contribución al estudio ...," *op. cit.*, pp. 193 and 197.
1195. Guitart Manday, "Las pesquerías pelágico-oceánicas ...," *op. cit.*, pp. 5-6.
1196. S. Moreno, A. Rodriguez, J. Pol, and L. Muñoz, "Los tiburones pelágicos en el noroccidente de Cuba," in *I Cong. Cienc. del Mar, Resúmenes* (Havana, 1987).
1197. Sonia Moreno and Jorge Pol, "Características biológico-pesqueras de *Carcharhinus falciformis* (Bibron, 1839) en el noroccidente de Cuba," *Ciencias Biológicas*, No. 24, 1992, pp. 127-128.
1198. Guitart Manday, "Las pesquerías pelágico-oceánicas ...," *op. cit.*, pp. 6-9.
1199. Moreno and Pol, "Características biológico-pesqueras ...," *op. cit.* pp. 127-133.
1200. Guitart Manday, "Las pesquerías pelágico-oceánicas ...," *op. cit.*, pp. 9-11.
1201. Hemingway writes that the mako is one of the few fish which "keep their heads completely" when trying to escape after being hooked and then "attack their captor viciously and cold-headedly". Hemingway says that a mako will "deliberately leep at a man in a dory who has hooked him on a handline" and reports that the "commercial" (artisanal) fishermen at Cojímar confirm this. Hemingway even filmed one such attack. Hemingway, "Cuban fishing," *op. cit.*, p. 157.
1202. Martinez, "The Cuban shark industry," *op. cit.*
1203. Guitart Manday, "Las pesquerías pelágico-oceánicas ...," *op. cit.*, pp. 12-15.
1204. Castro, Woodley, and Brudek, "A preliminary evaluation ...," *op. cit.*, pp. 50-51.
1205. Guitart Manday, "Las pesquerías pelágico-oceánicas ...," *op. cit.*, pp. 15-17.
1206. Claro, Baisre, and Garcia-Arteaga, "Management of fishery resources," *op. cit.*
1207. Guitart Manday, "Las pesquerías pelágico-oceánicas ...," *op. cit.*, pp. 17-20.
1208. Pol and Moreno, "Los palangres ...," *op. cit.*. p. 32.
1209. Claro, Baisre, and Garcia-Arteaga, "Management of fishery resources," *op. cit.*
1210. Guitart Manday, "Las pesquerías pelágico-oceánicas ...," *op. cit.*, p. 20.
1211. Guitart Manday, "Las pesquerías pelágico-oceánicas ...," *op. cit.*, p. 20.
1212. Guitart Manday, "Las pesquerías pelágico-oceánicas ...," *op. cit.*, pp. 20-22.
1213. Guitart Manday, "Las pesquerías pelágico-oceánicas ...," *op. cit.*, p. 22.
1214. Claro, Baisre, and Garcia-Arteaga, "Management of fishery resources," *op. cit.*
1215. Guitart Manday, "Las pesquerías pelágico-oceánicas ...," *op. cit.*, p. 22.
1216. Henry B. Bigelow and William C. Schroeder, "Sharks," Ch. 2 in *Fishes of the Western North Atlantic*, Mem Sears Found. Mar Res., no. 1, pt. 1, Yale University, 1948.
1217. Jean Cramer, "By-catch of blue sharks (*Prionace glauca*) reported by U.S. pelagic longline vessels from 1987-1995," *ICCAT Tuna Symposium/ICCAT Volume of Scientific Papers*, Vol. L (2) (ICCAT: Madrid, 1998), p. 703.
1218. Guitart Manday, "Las pesquerías pelágico-oceánicas ...," *op. cit.*, p. 23.
1219. Rodríguez, Nieto, and Castro, "Aspectos comparativos ...," *op. cit.*, p. 175.
1220. Inchcup, *op. cit.*, June 9, 2000.
1221. Rodríguez, *op. cit.*, September 13, 2001.
1222. Rodríguez, *op. cit.*, September 13, 2001. Dr. Rodríguez reports that the apparent shifts in the shark composition may well represent the increasing retention of sharks rather than an increased catch. This was in fact a problem encountered in assessing many of the Cuban studies used in this report. It is not always possible to determine if the catch data refers to actual catches or retained catches which excludes the discarded bycatch.

1223. Large numbers of blue sharks were reported, but were just finned. One of the species usually retained was makos. This changed in the late 1980s, however, as FAC gave more attention to efforts to use the shark meat rather than just discarding the finned carcasses. A. Rodríguez, *op. cit.*, August 17, 2001.
1224. Rodríguez, *op. cit.*, September 13, 2001. A variety of Cuban studies touched in this subject in both the distant-water fishery and the fisheries in the Cuban EEZ. See for example, Jorge Pol, Luis Muñoz, Sonia Moreno, and Andrés Rodríguez, "Evoución de la abundancia de grandes pelágicos en la región noroccidental de Cuba," *Revista de Investigaciones Marinas*, Vol. XI, No. 1, 1990, p. 45. This study analyzed the fishery in the Cuban EEZ (appendix C4a5). See Rodríguez, Nieto, and Castro, "Aspectos comparativos ...," *op. cit.* for a study assessing population trends and interrelationships in the distant-water fishery.
1225. Rodríguez, *op. cit.*, September 16, 2001.
1226. The FAO data should represent the entire catch, whether or not it was retained. Some countries, however, do not report bycatch which is not retained and FAO does not have the staff to assess each national catch submission in detail. One Cuban observers does believe that more of the previously discarded sharks were being retained. Rodríguez, *op. cit.*, September 16, 2001.
1227. One researcher remembers the shark bycatch in this range at about 25 percent. Rodríguez, *op. cit.*, September 16, 2001. We have used Cuban catch data from the eastern Atlantic because that was primarily the results reported by the FAC longliners. Data from the western Atlantic included the more artisanal coastal shark fishery.
1228. Rodríguez, *op. cit.*, September 13, 2001.
1229. Rodríguez, *op. cit.*, September 16, 2001.
1230. NMFS Southeast Fisheries Center, "NOAA ship *Oregon II* cruise ...," *op. cit.*
1231. Long-time Caribbean shark specialist José Castro reports that he has also seen no Cuban reports describing the species bycatch of the distant-water longline fishery. José Castro, NMFS, personal communications, July 1 5, 1999.
1232. As noted above, these countries have not reported in detail on the bycatch composition of their Atlantic longline operations. One exception is the reporting required of the Japanese when operating in U.S. and Canadian waters. NMFS personnel working on sharks have also noted a few preliminary papers in recent years with some shark species data. John Hoey, *op. cit.*, August 3, 2001. An example of one of these papers is Buencuerpo, Ríos, and Morón, "Pelagic sharks ...," *op. cit.*, pp. 667-685.
1233. Guitart Manday, "Las pesquerías pelágico-oceánicas ..., " *op. cit.* Guitart-Manday has also published a monograph on Cuban sharks. D. Guitart Manday, *Los Tiburones* (Editorial Científico-Técnica: Havana, 1983), 57p. The authors were not able to obtain a copy of this report .
1234. Cuban biologists report that variations in effort and changes in the industry make it difficult to assess the shark resource, but note a clear declining trend since 1990. Claro, Baisre, and Garcia-Arteaga, "Management of fishery resources," *op. cit.*
1235. Grahame J.W. Webb, Wildlife Management International (Australia), personal communications, February 21, 2000.
1236. Available data suggests that there are significant correlations between Cuban and U.S. data (appendix C11e).
1237. Crammer, "Large pelagic logbook," *op. cit.*, 29-31.
1238. Ubeda, "Tuna fishing ...," *op. cit.*, p. 13.
1239. The cruise report includes detailed catch data. NMFS Southeast Fisheries Science Center, "NOAA ship *Oregon II* cruise ...," *op. cit.*
1240. The authors reviewed only one year of U.S. catch data to obtain a rough idea of the species involved. A more through assessment of U.S. catch trends is necessary to present a valid assessment of U.S. catch trends.
1241. Claro, Baisre, and Garcia-Arteaga, "Management of fishery resources," *op. cit.*
1242. J.A. Baisre, "La pesca en Cuba: Apuntes para su historia," *Mar y Pesca*, No. 262, July, 1987, pp. 41-42. One important study of pre-Colombian fisheries does not list Cuba as an island on which turtles were exploited by Native Americans. E.S. Wing and E.J. Reitz, "Prehistoric fishing economies of the Caribbean," *New World Archeology*, Vol. 5, No. 2, 1982, pp. 13-22. Certainly there was widespread use of turtles throughout the Caribbean for millennia. Baisre turned to important contemporary texts to confirm that Native Americans on Cuba were taking turtles. He quotes from Gonzalo Fernández de Oviedo in the summary of the *Natural Historia de las Indias* (1525).
1243. Carrillo, Machado, and Sánchez, "Annex 3. Regulations ..., *op. cit.*. p. 72 and Baisre, "La pesca en Cuba," *op. cit.*

1244. Ley General de Pesca, Decreto-Ley No. 704, 1936. There may have well been colonial era regulations, but the authors, at this time have no information confirming this. Cuba researchers did not list any such legislation in a time table of sea turtle, management, use, and abundance. Carrillo, *et. al.* "Anexo 3. Regulación ...," *op. cit.*, p. 69.
1245. Elvira Carrillo C., Joaquín Machado C., and Plácido Sánchez, "Regulación del uso de *E. imbricata* en Cuba," *Revista Cubana de Investigaciones Pesqueras*, January-June 1998, pp. 69-71.
1246. MIP Resolución 298, 1994.
1247. Resolución 117 of the Ministerio de la Industria Pesquera established state control on acquiring and marketing sea turtle products and byproducts.
1248. The 1985-86 turtle catches were unusually high. Cuban scientists were not convinced that the open/closed season times were the best compromise for all three species (green, hawksbill, and loggerhead) being harvested. As a result, officials allowed harvests to be conducted through the 1985-86 breeding season so that biologists could obtain definitive data on the breeding cycles of each species. This data was subsequently used to change the fishing seasons. Webb, *op. cit.*, January 23, 2001 and Moncada, *op. cit.*, February 8, 2001.
1249. Félix Moncada, CIP, personal communications, February 8, 2001.
1250. Cuban managers redeployed fishing effort to other more profitable coastal fisheries such as the lobster fishery. CIP, "An annotated transfer of the Cuban population of hawksbill turtles (Eretmochelys imbricata) from Appendix I to Appendix II of CITES," *Revista Cubana de Investigaciones Pesqueras*, January-June, 1998, p. 34.
1251. Moncada, *op. cit.*, February 8, 2001.
1252. The reduced availability of fuel forced many fishermen to curtail operations. This would have reduced incidental catches and perhaps directed catches as well.
1253. An Australian consultant reports that with the exception of two traditional harvesting areas taking less than 50 t per year, all sea turtles were protected in Cuban waters in 1995. He believes that a "major part" of the reason for declining Cuban turtle harvests has been a dramatic change in fishing effort and the fact that Cuban officials in 1995 began protecting turtles in over 99.5 percent of all Cuban waters. Webb, *op. cit.*, January 22, 2001 and CIP, "An annotated transfer, *op. cit.*, p. 34. An overview of Cuban regulations on turtles is available in Carrillo, Machado, y Sánchez, "Regulación del uso ...," *op. cit.*, pp. 69-71.
1254. Elvira Carrillo, Programa Nacional de Tortugas Marinas, CIP, personal communications, February 29, 2000.
1255. Moncada, *op. cit.*, February 8, 2001.
1256. Moncada, *op. cit.*, February 8, 2001.
1257. One Cuban researcher in an article written with Australian collaborators contends that hawksbill "regional trends were stable and possibly increasing rather than decreasing during the 1980s and 1990s". Carrillo, Webb, and Manolis, "Hawksbill turtles ...," *op. cit.*, p. 264. Another Cuban researcher reports that Cuban shifted effort to other fisheries even though "stocks were abundant". Moncada, *op. cit.*, February 8, 2001 and F. Moncada, "Impact of regulatory measures on Cuban marine turtle fisheries," 18th Sea Turtle Symposium, 2000. Also Moncada, *op. cit.*, May 6, 2001. (As a result of communications difficulties with Cuba, the May 6, 2001 information was relayed by Australian researcher Charles Manolis.) Details on the Cuban assessments are included under the individual species below.
1258. CIP, "Preface," *Revista Cubana de Investigaciones Pesqueras*, January-June, 1998, p. v.
1259. Félix Moncada-G, Ana María Rodríguez, René Márquez-M. and Elvira Carrillo, "Report of the olive Ridley turtle (*Lepidochelys olivacea*) in Cuban waters," *Marine Turtle Newsletter*, October 2000, p. 13.
1260. There is some dispute about just what is an "important" nesting beach. Not all turtle experts are convinced with the information available that the Cuban beaches are indeed as important as suggested by Cuban officials.
1261. The researchers involved have asked that their names not be mentioned. The authors do not know to what extent other foreign researchers had similar experiences and are unsure how to interpret these accounts. Certainly Cuban researchers may not be able to accommodate all interested foreign researchers. One possible interpretation is that the Cubans only want to work with researchers who they believe will support their CITES hawksbill proposals. Another possibility is that Cuban researchers were unable to get higher level authorization for work with U.S. researchers for general political reasons. The reasons that Cuban officials have chosen not to work with or in some cases exchange information with some respected U.S. turtle experts, however, is unknown. Any evaluation of the turtle research conducted by Cuban and foreign researchers should be conducted with the knowledge that the selection process for their foreign partners is unknown and could be biased toward investigators that would tend to look favorably on their desire to continued commercial exploitation.
1262. Moncada, *op. cit.*, February 8, 2001.

1263. Elvira Carrillo, Grahame J.W. Webb, and S. Charlie Manolis, "Hawksbill turtles (*Eretmochelys imbricata*) in Cuba: An assessment of the historical harvest and its impacts," *Chelonian Conservation and Biology*, 1999, Vol. 3, No. 2, pp. 264-280.
1264. Moncada, *op. cit.,* May 6, 2001.
1265. The Bermuda researchers have received 8 tag returns from Cuba. One green turtle with a radio transmitter attached disappeared around the Windward Passage near the Cuban town of Barracoa. The turtle was traveling in a straight line, suggesting it was going to enter the Caribbean through the Windward Passage. Anne Meylan and Peter Meylan, "'Bermudian,' a case for international protection of sea turtles," *Velador*, 1999. For more details see the Bermuda chapter of this report. Cuban researchers report that there have been tag returns noted in Cuba from various other countries and that the origins of Bermuda nesters should not be overstated. Cuban officials also point out that greens tagged in Cuba have also been taken in other countries. Moncada, *op. cit.*, February 8, 2001. Brazilian researchers have reported turtles tagged in Brazil being recovered in Nicaragua. E.H.S.M. Lima, *et. al.*, "From one feeding ground to another: Green turtle migration between Brazil and Nicaragua," *Marine Turtle Newsletter*, 1999, No. 85, p. 10.
1266. As mentioned above, officials suspended the seasonal closures in 1985 to obtain data needed to assess the timing of the annual seasonal closures. Webb, *op. cit.*, January 23, 2001.
1267. The authors note that hawksbill turtle catches (only data on hawksbills is available dating back beyond 1976) from 1950 through the 1960s were highly variable, 11 t (1950) to 300 t in 1968. After the Fisheries Ministry formally began managing the turtle fishery in 1968, catches increased, but by 1971 had become less volatile. Catches during 1971 to 1989 ranged from 206 t (1971) to 285 t (1982), excluding 1985 when controls were removed to allow officials to assess the annual seasonal closures (appendix F2b1). The fact that hawksbill catches spiked up to 322 t is an indication that Cuban officials were limiting effort. The catch of green turtles followed similar patterns for the more limited time line for which data is available. The catch of green turtles, for example, increased from only 211 t in 1984 to a record 513 t in 1985 (appendix F2b2).
1268. Moncada, *op. cit.*, May 6, 2001. The authors do not have access to the actual Cuban CPUE studies. Because of the international controversy concerning hawksbills, the Cuban research on that species has been published and widely distributed. Research on green turtles is less accessible.
1269. Moncada, *op. cit.*, May 6, 2001.
1270. Ibarra Martín, *et. al.*, "University project ...," *op. cit.*, p. 11 and Anna L. Bass, "Genetic analysis to elucidate the natura history and behavior of hawksbill turtles (*Eretmochelys imbricata*) in the wider Caribbean: a review and re-analysis," *Chelonia Conservation and Biology*, Vol. 3, No. 2, 1999, pp. 195-199.
1271. R. Díaz-Fernández, R. Okayama, T. Uchiyama, E. Carrillo, G. Espinoza, R. Márquez, C. Diez, and H. Koiki, "Genetic sourcing for the hawksbill turtle, *Eretmochelys imbricata*, in the northern Caribbean region," *Chelonian Conservation and Biology*, 1999, Vol. 3 No. 2, pp. 296-300 and Bass, "Genetic analysis ...," *op. cit.*, p. 197. One researcher notes that the record from Antigua is now in doubt because this haplotype has been found in Cuban nests. Webb, *op. cit.*, January 22, 2001. Bass reports that the situation concerning Antigua is actually more complicated. She reports that one of the haplotypes, A, found in nesting females from Antigua has also been found nesting in Cuba. But that haplotype has also been found in Barbados, Costa Rica, Puerto Rico, and Brazil. That doesn't negate the potential contribution of the Antiguan nesting population to Cuba. What she believe needs to be noted is that haplotype B to date only found in nesting females from Antigua was found foraging in Cuba (and Puerto Rico). Bass notes that it may be that Cuban researchers have found that haplotype in a nesting female from Cuba, but if so, that is their "hidden" data and hasn't been published anywhere. Anna Bass, University of Florida, personal communications, February 8, 2001.
1272. Carrillo, *et. al.*, 1999 and Manolis *et. al.*, 2000.
1273. K.A. Bjorndal and A.B. Bolton, "Hawksbill tagged in the Bahamas recaptured in Cuba," *Bahamas Journal of Science*, Vol. 5, no. 2, February 1998, p. 33.
1274. Elvira Carrillo, "Workshop on the management and sustainable use of marine turtles," *Marine Turtle Newsletter*, January, 2000, p. 15.
1275. Moncada, *op. cit.*, February 8, 2001.
1276. Elvira Carrillo, Programa Nacional de Tortugas Marinas, CIP, personal communications, February 29, 2000.
1277. Elvira Carrillo, Félix Moncada G., Gonzalo Nodarse, Carlos Pérez P, and Ana María Rodríguez, "Anexo 5. Tendencias en los datos de las capturas históricas," *Revista Cubana de Investigaciones Pesqueras*, January-June 1998, pp. 89-94. p. 93.
1278. An inventory of actual management restrictions are listed in Carrillo, *et. al.*, "Anexo 3. Regulación ...," *op. cit.,* p. 69.
1279. Bass, "Genetic analysis ...," *op. cit.*, p. 197.

1280. Australian researcher Charles Manolis with Wildlife Management International, for example, concurs with the Cuban findings. Charles Manolis, Wildlife Management International, personal communications, May 6, 2001. Many of the foreign researchers and wildlife specialists who support the Cuban assessment of turtle populations work with Cuban institutes under contracts financed by Japanese interests.
1281. Moncada, *op. cit.*, May 6, 2001.
1282. Moncada, *op. cit.*, February 8, 2001.
1283. Moncada, *op. cit.*, May 6, 2001.
1284. Félix G. Moncada Gavilán, "Workshop on marine turtles nesting in Cuba," *Marine Turtle Newsletter*, October 2000, p. 17.
1285. Moncada, *op. cit.*, May 6, 2001.
1286. Moncada, *op. cit.*, May 6, 2001.
1287. Cuban turtles on the Isla de Juventud with over 50 years experience have reported that loggerhead catches have declined relative to greens and hawksbills. Cuban materials distributed at CITES COP10 and Moncada, *op. cit.*, May 6, 2001.
1288. One turtle expert believes that the apparent decline in loggerhead abundance is of tremendous importance to the debate over hawksbills. If loggerhead stocks in Cuban waters were over fished, then this greatly reduced the economic return of the overall marine turtle fishery in Cuban waters. This would be a strong incentive for redirecting fishing resources from turtles to other marine resources. The Cuban argument that the annual hawksbill take was voluntarily reduced must be seen in the light of both the fundamental change in export markets (with Japan lifting its reservation on hawksbills, and thereby closing the last export market) as well as the economic return from a marine turtle fishery. The recent increase in loggerhead nesting in Florida may be directly related to a major reduction in exploitation of loggerheads in Cuban waters, which also have been subject to a minimum legal size. Frazer, *op. cit.*, February 17, 2001.
1289. Moncada, *op. cit.*, February 8, 2001.
1290. Barbara Schroeder, NMFS Turtle Coordinator, letters to Elvira Carrillo, Cuban Marine Sea Turtle Project Coordinator, January 31 and August 17, 2000. The Bermuda Turtle Project also reports losing a green turtle with a radio tag off Cuba. Meylan and Meylan,"Bermudian ...," *op. cit.*
1291. Cuban researchers report difficulty responding to the NMFS requests. "Often information relating to these turtles has been sent well after the animals entered Cuban waters and attempts by the National Office of Fisheries Inspection to locate transmitters or animals have not been successful." Moncada, *op. cit.*, February 8, 2001.
1292. The reason that Cuban officials are unable to return the tags is that if that simply do not have them. An Australian researcher working with the Cubans reports, "Cuba has always provided tags to their home source, and always presented the results of their own satellite tracking and DNA studies openly and transparently." Webb, *op. cit.*, January 22, 2001. Webb is referring to turtle studies. The authors have noted that the Cubans have not returned NMFS tags on swordfish and tag returns of billfish and other large pelagics have been sporadic. Mauricio Ortiz, NMFS, personal communications, January 22, 2001. The NMFS tags returned by the Cubans have come from sport fishermen and commercial fishermen operating in coastal waters, but FAC in its years of operations did not return NMFS tags. Cuban fishermen who take turtles may not report them for fear of fines or other punishment. The fishermen may use an incidentally caught turtle for subsistence or sell it on the thriving Cuban black market.
1293. One other possibility is natural mortality. The transmitters on one of the turtles indicated, however, that the turtle was moved inland before the transmitter ceased. This strongly suggests that the turtle was taken in a fishery and landed. Barbara Schroeder, *op. cit.*, August 23, 2000.
1294. A Pérez, *op. cit.*, August 28, 2001.
1295. Roberto Cardona and Ramiro de la Rúa, "Protejamos nuestras tortugas," *Boletín de Divulgación Técnica*, No. 5 (Instituto Cubano del Libro: Havana, 1972), p. 21.
1296. Cardona and de la Rúa, "Protejamos nuestras tortugas," *op. cit.*, p. 21.
1297. E.C. Carrillo and her colleagues during 1999 published a series of reports on hawksbills and other sea turtles in the *Revista Cubana de Investigaciones Pesqueras*, volume 22, number 1.
1298. Webb, *op. cit.*, January 22, 2001.
1299. Financial constraints limiting telephone usage, computers, internet connections, postage, printing, etc. may account for some of the difficulties. Internal agency policies restricting the exchange of information may be another factor. Another factor is an all to common tendency in Cuba not to widely distribute data, but to share it with those individuals or group that are considered most reliable.

1300. Cuban reviewers felt this statement to be unfair. One respected Cuban researcher, for example, writes, "Given the economic blockade imposed on Cuba by the United States, Cuba is forced to look at different options for economic growth. Cuba is no different to other countries in the region which also have economic problems (albeit without economic sanctions)." Moncada, *op. cit.*, February 8, 2001. Moncada makes a valid point. Cuba is not the only Caribbean country where turtles are taken. It is also not the only Caribbean country with balance of payments problems. The authors believe, however, that Cuba does need to be singled out because it has an especially severe balance of payments problem and because it has in most years taken and continues to take larger quantities of turtles than any other country in the region (appendix F2d). Many environmentalists also view Cuba as special case because independent domestic environmental groups willing to question the Government on important questions of policy are unable to operate. Likewise, international environmental groups are unable to conduct fact finding trips to Cuba to confirm official Government statements. The Cuban Government only permits international NGOs to operate in Cuba that are supportive of Government programs.
1301. Webb, *op. cit.*, January 23, 2001.
1302. "Annex 11. Management of turtle shell in Japan," *Revista Cubana de Investigaciones Pesqueras*, January-June, 1998, pp. 168-169.
1303. The publications on turtles during the 1990s are in sharp contrast to the other Cuban fishery publications and clearly show foreign support. Because of the economic crisis, publication of fisheries research virtually ceased in Cuba. The few publications that were released were low-cost editions or extremely poor quality paper. Cuba imports almost all of its paper, so publishing was sharply curtailed in the 1990s because foreign currency was in such short supply. The limited and poor quality Cuban publications were in sharp contrast to a 1998 edition of the *Revista Cubana de Investigaciones Pesqueras* devoted exclusively to turtles. The edition was a large format publication with high quality pages and even some color photographs. Each of the articles were translated into English. This is the most expensive Cuban fishery publication that the authors have ever seen in 25 years of following Cuban fisheries.
1304. U.S. Department of State, "CITES-COP: Demarches on hawksbill turtles; elephants," message number 30731, February 18, 2000 and Webb, *op. cit.*, January 22, 2001.
1305. The Caribbean Conservation Corporation, the International Fund for Animal Welfare, WIDECAST, and the Center for Marine Conservation held a joint press conference on April 12, 2000 in which the Cuban proposal was sharply criticized. Costa Rican WIDECAST Country Coordinator, Didiher Chacon, commented that "Many feel that the proposed Cuban harvest is being conducted on the backs of the other countries in the Caribbean, which are doing their part to protect hawksbills." Caribbean Conservation Corporation, "Hawksbill proposals are a croc," press release, April 12, 2000.
1306. A summary of the U.S. findings is available in U.S. Fish and Wildlife Service, "Comments of the United States on proposals to amend appendices I and II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora," document provided to CITES on January 31, 2000.
1307. A Brazilian researcher helped collect a series of studies on hawksbills in the Caribbean for a special issue of *Chelonian Conservation and Biology*. Maria Angela (Neca) Marcovaldi, "Biology and status of the hawksbill in the Caribbean," *Chelonian Conservation and Biology* Vol. 3, No. 2, April 1999, p. 173. Readers seeking more information on the issue are encouraged to review the reports collected by Dr. Marcovaldi.
1308. Oscar Ramirez, SEMARNAP, presentation at CITES meeting, April 20, 2000 and Nancy Daves, NMFS, personal communications, January 22, 2001. Unconfirmed reports suggest that even some Cuban researchers object to their Government's position on the CITES hawksbill proposal, but can not speak out. Barbara Schroeder, NMFS, personal communications, January 23, 2001.
1309. Webb, *op. cit.*, January 22, 2001.
1310. It is unclear to the authors to what extent the positions of member countries at CITES on the Cuban proposal were based on the science involved. Cuba has built up considerable good will in Africa and several African countries routinely support Cuban positions in international fora. Several Caribbean island governments are known to base their positions at international fora like CITES and the IWC on a host of other concerns and interests besides the science issues involved. Some Latin American Governments sometimes base their votes on a generalized Latino solidarity with Cuba on questions where the United States is involved. Likewise, some other countries may have based their position on support of the United States. One Australian researcher tells the authors, for example, that the Australian science authority evaluating the Cuban proposal in depth and recommended that it be supported, but Australia opposed the Cuban proposal because of representations by the United States. Webb, *op. cit.*, January 24, 2001. The authors believe while non-scientific issues do cut both ways, the number of countries that supported the Cuban proposal on non-scientific grounds probably was quite large. Clearly the votes at international fora on seemingly scientific issues are in many cases much more complicated and the votes should not be taken of

endorsement or rejection of the science issues involved, even when substantial majorities are involved.
1311. Webb, *op. cit.*, January 22, 2001.
1312. Available information on turtle regulations on each island is addressed in the individual country chapters of this report. In addition TRAFFIC North America's report on the exploitation, trade, and management of marine turtles in the northern Caribbean is in press. Elizabeth Fleming, TRAFFIC North America, personal communications, March 20, 2001.
1313. Moncada, *op. cit.*, February 8, 2001.
1314. A.B. Meylan, "Status of the hawksbill turtle (*Eretmochelys imbricata*) in the Caribbean region, *Chelonian Conservation and Biology*, 1999 Vol. 3 No. 2, pp 177-184 and A.B. Meylan and M. Donnelly, "Status justification for listing the hawksbill turtle (*Eretmochelys imbricata*) as Critically Endangered on the 1996 *IUCN Red List of Threatened Animals*," *Chelonian Conservation and Biology*, 1999 Vol. 3 No. 2, pp. 200-224. Also see individual island chapters for details.
1315. Luis Ubeda, "El *Cherna* en campaña," *Mar y Pesca*, June 1969, p. 15.
1316. A U.S. researcher reports that Félix Moncada has presented a paper of fishery interactions at a unidentified turtle meeting. The authors are unsure if it has been published. Moncada reports that he did compile some information on bycatches, but that it was in the early 1980s. He reports that, "More detailed assessment of incidental catch is continuing." Moncada, *op. cit.* May 6, 2001. The authors have no details on Moncada's papers which do not appear to have been published. Neither do we have any details on the nature of the continuing Cuban bycatch assessments.
1317. Elvira Carrillo provided the authors some details which are described below. Carrillo, *op. cit.*, February 29, 2000. Félix Moncada as reported above has done some work on interactions and has delivered an oral paper. Moncada, *op. cit.*, February 27, 2001. The paper was delivered at an unidentified turtle meeting, but was apparently never published. The authors in a telephone have expressed an interest in including details on his research in this report.
1318. Webb points out, "The problem is that if turtles are NOT a problem in this or that fishery, it is clearly difficult for Cuba to justify a major research effort to quantify it largely for cosmetic purposes." Webb, *op. cit.*, January 22, 2001.
1319. Jack Frazer, Conservation and Research Center, Smithsonian Institution, personal communications, August 17, 2000.
1320. Cuban documents submitted at CITES COP10, section 4.3.
1321. Loggerhead interactions also occur in the Atlantic. There is little documentation of this, however, except by the U.S. fleet.
1322. Barbara Schroeder, NMFS Turtle Coordinator, personal communications, August 23, 2000.
1323. See for example the January-June issue of *Revista Cubana de Investigaciones Pesqueras*.
1324. Schroeder, *op. cit.*, August 23, 2000.
1325. Carrillo, *op. cit.*, February 29, 2000.
1326. Grahame J.W. Webb, Director, Wildlife Management International (Australia), personal communications, February 21, 2000.
1327. An excellent recent overview of the Cuban shrimp fishery is available in Joyce, "Socialism and the fishery ...," *op. cit.*, pp. 53-69.
1328. Carrillo, *op. cit.*, February 29, 2000.
1329. As mentioned above, Félix Moncada has done some now dated work on bycatch, but the authors know of no actual publication.
1330. Webb, *op. cit.*, February 21, 2000.
1331. The state-owned character of the Cuban shrimp and other fishing fleets is a factor to be considered in assessing public releases from the Ministry of Fisheries (MIPES). This is not a statement specifically directed at MIPES, however, the environmental record of state corporations in general suggests that considerable caution should be exercised in evaluating such public releases. State corporations often have conflicting interests. MIPES has devoted some energy in protecting turtle populations in Cuba, but they also have a vested interest in maximizing fisheries production and export marketing. These goals can conflict. Thus assessments of turtle interactions by Cuban officials have to be treated with some caution. Assessments of limited turtle interactions are also likely from the fishermen themselves. This problem is likely to intensify as the fishermen are given increased autonomy. The authors are unsure if MIPES actually compiled any kind of statistical report assessing turtle interactions. Even so, MIPES would be unlikely to authorize the public release of data substantiating that Cuban fishing activities are adversely affecting turtles.

1332. One of Cuba's principal turtle researchers reports very limited interactions. Carrillo, *op. cit.*, February 29, 2000. The principal researcher on tuna and swordfish during the 1980s also reports that he did not observe artisanal longline interactions with turtles. Rodríguez, *op. cit.*, September 13, 2001.
1333. Webb, *op. cit.*, February 21, 2000.
1334. NMFS, "Scoping workshops: Implementation of 2000 biological opinion," July 31, 2000.
1335. A. Rodríguez, *op. cit.*, August 17, 2001.
1336. One Cuban sea turtle expert told the authors that she had no information on the FAC sea turtles. Carillo, *op. cit.* February 29, 2000. It is likely that if FAC had a program to protect sea that Carillo would have known about it.
1337. James Richardson, Department of Ecology, University of Georgia, personal communications, June 28, 1999.
1338. A.R. Estrada and A.A. Mignucci-Giannoni, "Status of manatees in Cuba," manuscript in preparation at the Laboratorio de Mamíferos Marinos del Caribe (LMMC) at the Universidad de Puerto Rico. Document listed on the LMMC website accessed August 8, 2001: http://rcv.caribe.net/english/investigciones.htm
1339. "El niño y el delfin," *Mar y Pesca*, May, 1986, p. 45.
1340. Orlando Lima, "Ballena en Boca de Galafre," *Mar y Pesca*, July 1989, pp. 17-19.
1341. "Ballena en Gibara," *Mar y Pesca*, March 1978, p. 5.
1342. The cruise report includes detailed catch data. NMFS Southeast Fisheries Science Center, "NOAA ship *Oregon II* cruise ...," *op. cit.*
1343. See for example Bernd Wursig, Thomas Jefferson, and David Schmidly, *The Marine Mammals of the Gulf of Mexico* (College Station: Texas A&M Press, 2000).
1344. A. Rodríguez, *op. cit.*, August 17, 2001.
1345. "Los definarios en México--Un informe crítico," a report prepared with the support of 8 environmental groups, date unknown.
1346. Hugo P. Castello, "Captive marine mammals in South America," *Whales Alive* (Cetacean Society International), Vol. 7, No. 1, January 1, 1998.
1347. Lesli Bisgould and Brian McHattie, "Dolphins dying all around us: Whale and dolphin captivity in Canada," *Globe and Mail*, June 2001.
1348. Ruud van Halewyn and Robert L. Norton, "The status and conservation of seabirds in the Caribbean," in J.P. Croxall, P.G.H. Evans, and R.W. Schreiber (eds.), "Status and conservation of the world's seabirds," *ICBP Technical Publication*, No. 2 (ICBP: Cambridge, 1984), pp. 175-176.
1349. See for example Lourdes Mugica and Martín Acosta, "Breve caracterización de la comunidad de aves de Cayo Largo y Cayo Hicacos (Grupo Insular de los Canarreos)," *Ciencias Biológicas*, No. 25, 1992, pp. 20-29 and Bárbara Sánchez, Daysi Rodríguez, and Arturo Kirkconnell, "Avifauna de los cayos Paredón Grande and Coco durante la migración otoñal de 1990 y 1991," *Avicennia*, 1994 Vol 1, pp. 31-38.
1350. Pedro Blanco Rodríguez, "Censos de aves acuáticas en el humedal costero Las Salinas de Ciénaga de Zapata, Matanzas, Cuba," *Avicennia*, 1996, No. 4-5, pp. 51-55.
1351. Daysi Rodríguez, Bárbara Sánchez, Alejandro Torres, and Alfredo Rams, "Composición y abundancia de las aves durante la migración otoñal en Gibara, Cuba," *Avicennia*, 1994, Vol. 1, pp. 101-109.
1352. Matín Acosta, José Morales, Miguel Gonzalez, y Lourdes Mugica, "Dinámica de la comunidad de aves de la playa La Tinaja, Ciego de Avila, Cuba," *Ciencias Biológicas*, No. 24, 1991, pp. 44-58
1353. Hiram González, Esteban Godinez, Pedro Blanco, and Alina Pérez, "Características ecológicas de las comunidades de aves en diferentes habitats de la Reserva de la Biosfera Península de Guanahacabibes, Pinar del Río, Cuba," *Avicennia*, 1997, Vol. 6-7, pp. 103-110.
1354. S. Peris, B. Sánchez, D. Rodríguez, H. González, M. Acosta, L. Mugica, and O. Torres, "El atlas de aves nidificantes de Cuba: Resultados preliminares," *Avicennia*, 1995, Vol. 3, pp. 97-102.
1355. The cruise report includes detailed catch data. NMFS Southeast Fisheries Science Center, "NOAA ship *Oregon II* cruise ...," *op. cit.*
1356. P. Blanco, S.J. Peris, B. Sánchez, *Las Aves Limícolas (Charadriiformes) Nidificantes de Cuba. Su Distribución y Reproducción* (Ed. Centro Iberoamericano de Biodiversidad: Universidad Alicante--España, 2001), 62p. This excellent work includes maps detailing nesting sites fr each species.
1357. Salvador J. Peris, Universidad Salamanca, personal communications, January 17, 2001.
1358. Rodolfo Claro, Instituto de Oceanologia, personal communications, January 29, 2001 and Grajal, *op. cit.*, August 7, 2001. Grajal cautions that he is not familiar with Cuban fishery journals.
1359. Gómez, "Caracterización de los cardumenes ...," *op. cit.*, p. 12.
1360. Claro, *op. cit.*, January 29, 2001.
1361. Rodríguez, *op. cit.*, September 13, 2001.

1362. Rodríguez, *op. cit.*, August 17, 2001.

SECTION XVI. (International)

1363. CARICOM, "CARICOM/Cuba discuss areas for cooperation," *Newsletter of the CARICOM Secretariat*, internet posting accessed February 1, 2000: http://www.caricom.org/ccsvjtom.htm See the Caribbean overview of this report for details on CFRAMP.
1364. ICCAT, "Report of the meeting of the Standing Committee on Finance and Administration," *ICCAT Report*, 1987, Part II, SCRS/87/13/Amended (ICCAT: Madrid, Spain, 1988), pp. 100-101.
1365. ICCAT, "Administrative report, 1992," COM/93/9, *ICCAT Report* Part II, 1992-93 (ICCAT: Madrid, Spain, 1994), p. 10.
1366. Suárez Caabro, *Cuba y Su Pesca*, *op. cit.*, p. 125.
1367. An analysis of foreign fishing in other ICCAT 5° squares is available in the chapters on neighboring countries (Cayman Islands, Jamaica, Haiti, Turks and Caicos, and the Bahamas). The authors believe that relatively little of the foreign fishing in these ICCAT 5° squares would be in actual Cuban waters.
1368. Grahame Webb, photograph caption, *Revista de Investigaciones Pesqueras*, January-June 1998, Vol. 22, No. 1, p. 75
1369. Uozumi, "Preliminary analysis ...," *op. cit.*, p. 29 and ICCAT, "1994 SWO background document: Figures," *ICCAT Collective Volume of Scientific Papers* (ICCAT: Madrid, Spain, 1995), p. 91.
1370. The bulk of Mexico's swordfish catch is taken in the Pacific off the Baja in a driftnet fishery. Mexican fishermen have, however, begun to experiment with longlines and Pesca, the Mexican fisheries agency, is permitting some test longline fishing. Jeronimo Ramos, Director General for Management, PESCA, personal communications, September 23, 2000.
1371. For details see Dennis Weidner and David Hall, "Latin America," *World Fishing Fleets*, IV (NMFS: Silver Spring, Md, 1993), p. 214.
1372. See for example, ICCAT, "1994 SWO background document: Figures," *op. cit.*, p. 91.
1373. For details on the largely artisanal Puerto Rican fishery, see the Puerto Rican chapter of this report.
1374. Taiwan authorities assure the authors that no Taiwan longliners are registered in Panama. Chen, *op. cit.*, November 6, 2000. The authors have noted, however, several references to Panamanian-flag for the Boada longliners.
1375. Details on the U.S. swordfish fishery are available in Karyl K. Brewster-Geisz, "United States," *World Swordfish Fisheries*, Vol. V. (NMFS: Silver Spring, Maryland), pp. 63-102.
1376. Jean Crammer, "Large pelagic logbook newsletter - 1995," *NOAA Technical Memorandum* NMFS-SEFSC-394, November 1996, p. 3.
1377. U.S. Department of State, "U.S. commercial swordfish fishing off Cuba," message number 283757, November 7, 1978 and U.S. Department of State, "Commercial swordfish fishing by US vessels off Cuba," message number 17213, January 22, 1979.
1378. The authors stress that this appears to be an administrative decision by the Cuban Government. Under Cuban and international law, U.S. and other foreign fishermen could be arrested and prosecuted. Cuban officials would probably be less tolerant of U.S. fishermen involved in other fisheries. In addition, Cuban policies toward foreign longline fishing could change at any time.
1379. Anonymous U.S. fisherman, personal communications, November 22, 2000.
1380. Sal'nikov, "Fishery research ...," *op. cit.*, p. 78.
1381. Suárez Castro, *Cuba y Su Pesca, op. cit.*, pp. 63-64.
1382. For a description of the economics of FLOCUBA operations see Weidner and Hall, "Latin America," *op. cit.*
1383. "Cuban Fishing Industry Minister arrives in Luanda," Havana domestic broadcast, 2214 GMT, March 8, 1978.
1384. Anonymous Cuban source, personal communications, March 10, 1980.
1385. U.S. Embassy, Rome, January 25, 1978; and U.S. Embassy, Kinshasa, February 14, 977. The U.S. Embassy in Rome notes that another knowledgeable source disagrees and claims that Cuba has provided fisheries development assistance to Angola and other African countries. U.S. Embassy, Rome, January 26, 1978.
1386. Jorge Picón, NMFS, personal communications, December 29, 1976.
1387. "Cooperation protocol signed with Angola," Havana, Prensa Latina, 2005 GMT, September 21, 1986; and "Risquet opens Angolan cooperation talks 9 Feb," Havana television broadcast, 0100 GMT, February 10, 1987.

1388. "Angola: Agreement signed with Cuba in fisheries," Luanda TPA Network in Portuguese, 1930 GMT, December 18, 1997.
1389. For details on Cuban-Soviet fishery relations, see Weidner and Jacobson, *op. cit.*
1390. For available details see Thomas and Weidner, *op. cit.*
1391. "Havana radio on British Falklands decision," Havana international service, 2300 GMT, January 30, 1987.
1392. "Pesquero cubano se hundió frente a costas argentinas tras chocar con nave de Taiwán," *Diario las Americas*, February 14, 1989.
1393. U.S. Embassy, Belize, "Cuba and Belize sign comprehensive fisheries agreement," message number 1183, October 8, 1999.
1394. INFOFISH, "Brazil: Fishing sector forced to develop," *INFOFISH Trade News*, March 15, 1999.
1395. "Cubans fined," *World Fishing*, March 1977.
1396. The agreement was signed during a visit of Canadian Fisheries Minister LeBlanc to Havana. "LeBlanc goes to Cuba to sign fishing agreement," *Fisheries and Marine News Service*, June, 1977.
1397. See for example "Convenio Cuba-Canada en la esfera de la pesca," *Mar y Pesca*, September, 1989, p. 30.
1398. Anonymous FLOCUBA official, October 7, 1993.
1399. FIS Europe, "Cuban vessel to fish for shrimp in Canada," *op. cit.*
1400. See for example U.S. Interests Section, Havana, October 4, 1978; and "Island saltfish expands operation," *The Southeaster*, August 15, 1985. Canada in turn imports Cuban seafood and is an important Cuban market for lobster, shrimp, and other fishery exports.
1401. The authors have noted several press reports to such purchases during the 1980s and 1990s, but do not have reports on every year.
1402. FAO reports that Cuba does not import cured fish during 1995-97, but did import $61,000 in 1998. There were no such imports in 1989. FAO, *Yearbook of Fishery Statistics: Commodities*, various years. It is possible that other purchases occur under non-commercial arrangements and are not included in the data Cuba provides FAO.
1403. For details on the state of Canadian fisheries see the Canadian chapter in William Folsom, David Rovinsky, and Dennis Weidner, "Western Europe and Canada," *World Fishing Fleets: An Analysis of Distant-water Fleet Operations, Past-Present-Future*, Vol. VI, (NMFS: Silver Spring, MD., 1993).
1404. "Cuba-Cape Verde accord," *Seafood International*, April 1999, p. 9.
1405. For details see Weidner and Hall, "Latin America," *op. cit.* and Thomas and Weidner, "Cuban-Latin American fishery relations," *op. cit.*
1406. Cosano Alén, "Irritantes cifras ...," *op. cit.*
1407. FAO reports minimal Cuban canned fishery imports in 1995 ($0.2 million) and none in 1996 and 1997. Cuba reported, however 4,500 t of canned imports valued at $5.2 million. These shipments increased sharply in 1999, totaling 19,700 t valued at $19.3 million. FAO *Yearbook of Fishery Statistics*, various years. The authors believe that these low-priced shipments, probably mostly canned jack mackerel, were largely imports from Chile.
1408. "Chinese delegation visits Cuba," Fish Info Service, September 4, 1998.
1409. Chinese Bureau of Fisheries, Ministry of Agriculture, "Review of national fisheries and research of the People's Republic of China," SCRS/98/184.
1410. ICCAT, *Statistical Bulletin* (ICCAT, Madrid, 1998), p. 66.
1411. ICCAT maintains catch data by country on its website. They have assigned a country code of 118 to China, but as of July 2000 (with catch data through 1997) there was no data entered. Presumably China has not yet submitted catch data by area.
1412. "Cuba: Dejó de pescar en la zona de Guyana," *Industrias Pesqueras*, March 1, 1981.
1413. U.S. Embassy, Port-au-Prince, Haiti, "Haiti and Cuba Sign Maritime Boundary Accord," November 11, 1977.
1414. U.S. Embassy, Port-au-Prince, "Haiti economic roundup," message number 850, March 23, 2000.
1415. INFOFISH, "Cuba/Spain: New trawlers in operation," *INFOFISH Trade News*, March 15, 1999.
1416. For details see the Mexican chapter in Weidner and Hall, "Latin America," *op. cit.* and Thomas and Weidner, "Cuban Fishery relations ...," *op. cit.*
1417. Oscar López, "Contactos fructíferos," *Mar y Pesca*, December 1989, number 291, pp. 14-15.
1418. Grace, *op. cit.*, March 9, 2000.
1419. "Pescadores cubanos no respetan veda en el Golfo," *El Nuevo Herald*, March 30, 1997.
1420. "Bilateral fisheries agreement examined," Havana Radio Rebelde in Spanish, 1700 GMT, April 14, 1998.
1421. U.S. Embassy, Windhoek, December 6, 1991.

1422. The Cuban media reported the visit by Namibian officials during April 1995. Reported in FBIS Chiva Chiva, April 22, 1995. Cuban press reports, however, did not address the frank discussions and reported inaccurately that the Namibians and Cubans agreed on a variety of propaganda statements continually published in the controlled Cuban media.
1423. "Agreement signed on setting up joint commission with Namibia," Tele Rebelde, Havana television broadcast, March 6, 1991.
1424. Anonymous FCP official, October 7, 1993.
1425. "Cuban fleet sails off Peru," *Fishing News International,* June 1997.
1426. Atlantic Scientific Research Institute of Marine Fisheries and Oceanography (AtlantNIRO), "National report of Russia," SCRS/98/96.
1427. Milan Kravanja and Ellen Shapiro, "The Baltic States, Commonwealth of Independent States, and eastern Europe," *World Fishing Fleets* (NMFS: Silver Spring, Maryland, November 1993), p. 112.
1428. Patrick E. Tyler, "Putin nurturing old friendships of a Soviet past," *New York Times*, December 13, 2000, p. A1.
1429. Scot Wilson, "In Cuba, Putin signals Russia's return to region," *Washington Post*, December 15, 2000, p. A30.
1430. A good review of early Cuban-Soviet cooperation is available in Milan Kravanja, "Soviet and Cuban Fishing in the Caribbean in James D. Theberge, ed., *Soviet Seapower in the Caribbean: Political and Strategic Implications* (Praeger: New York, 1972).
1431. Victor Schein, interviewed in *Bohemia*, November 5, 1982, p. 34.
1432. Calculating such deficits would require access to internal MIP data. A necessary part of any such calculation, however, would be the actual value of subsidized fuel and the lost opportunity cost of the investments in expensive imported vessels. The authors believe that the Cuban Government itself may not even know the extent of these deficits. The authors have asked several former CIP biologists is they had any information on the extent if the deficits. The general response is that they had wondered about it, but did not know. This is not surprising. Biologists in other countries may not have a detailed knowledge of the economics of a fishery they are studying. One biologists who worked with pelagic fisheries tells the authors that while still in Cuba he asked economists in the MIP about the profitability of the fishery. They also simply did not know the size of the deficits involved. Muñoz, *op. cit.*, August 14, 2001.
1433. See for example Zharov, "Resultado de los ...," *op. cit.*, p. 53 and Sokolov, "Investigaciones sobre ...," *op. cit.*, p.63.; and Valle, Mesenteva, and Rodríguez, "Nota sobre ...," *op. cit.*
1434. María Antonia Fernandez Mayo and James E. Ross, "Cuba: Foreign agribusiness financing and investment," *EDIS International Working Paper* IW98-7, University of Florida, 1992.
1435. U.S. Department of State, "Cuba," *op. cit.,* p. 3.
1436. Fernandez Mayo and Ross, "Cuba: Foreign agribusiness ...," *op. cit.*
1437. "Investment openings in Cuba--Sector fishing industry," *Cuban Economic News*, November 7, 1998.
1438. "For sale?" *Cuba News*, September 1993, p.5.
1439. *Tiempo*, August 7, 1983. The authors have been unable to obtain further details, but notes Cuban fishing off both Argentina and Namibia in the southeastern and southwestern Atlantic during the 1980s (appendix C1a2a).
1440. Some reports suggest that FAC closed in 1996. It appears that a small FAC office in MIPES has continued to function.
1441. Hainey, "Cuban trawler ...," *op. cit.*, p. 1.
1442. Cordeiro, "What a whopper!," *op. cit.*, p. 1.
1443. David DeSilva, Bermuda Sport Fishing Association, personal communications, March 3, 2000.
1444. Inchcup, *op. cit.*, June 9, 2000.
1445. Camara de Comercio de Cuba, "Lista de firmas y extranjeros radicados en Cuba," April 1994, internet posting retrieved November 14, 2000: http://www.geo.unipr.it/~davide/cuba/economy/empresas.html
1446. "Acuerdos para la colaboración pesquera," *Mar y Pesca*, September 1980, number 180, p. 6. The Cuban press refers to the Commission as the "Mixed Commission for Collaboration in the Area of Fisheries".
1447. "Chinese delegation visits Cuba," FIS website, http://www.fis-net.com/fis/hotnews/", posted September 4, 1998.
1448. "Acuerdos ...," *op. cit.*, p. 6.
1449. "Minister visits Norway," Fish Info Service, March 28, 1998.
1450. U.S. Embassy, Panama, July 2, 1993.

1451. "Attack of ships off Africa linked to past actions," Havana International Service 0000 GMT, July 17, 1980. Peruvian officials denied that the Navy was responsible. "Niega Perú informe de Cuba sobre hundimiento de un barco," *Diario las Americas*, August 21, 1977.
1452. Details are available in Tracey Thomas and Dennis Weidner, "Cuban fishery relations in the Americas, 1959-88," *International Fishery Reports,* (IFR-88/59), June 29, 1988, pp. 18-23.
1453. "Peruvian minister visits Cuba," Fish Info Service, February 16, 1999.
1454. "Acuerdos ...," *op. cit.*, p. 6.
1455. "Acuerdos ...," *op. cit.*, p. 6.
1456. Steve Col, "U.S., Spain tangle over Cuba," *Washington Post,* June 17, 1994.
1457. *Faro de Vigo*, October 19, 1984.
1458. Cooper, *op. cit.*, March 1, 2000.
1459. A Filipino fisherman, Fernando Nunga, working aboard the *Boada 5* on April 16, 1999, retrieved a tag from a bluefin tuna while fishing off Havana, Cuba. He reported other sets in Cuban waters in which bluefin tuna were taken. U.S. Embassy, Manila, "Bluefin tuna archival tag retrieval: Additional information," message number 14753, November 24, 1999. The authors have since learned that while the *Boada 5* was registered in Panama, in 1997 the registry was at least temporarily changed to the Philippines. The Panamanian Government was in the process of fining the vessel $100,000 for taking bluefin tuna in contravention of the ICCAT management regime, but as the vessel registration has changed it is unclear how the Panamanians will proceed. The *Boada 5* continued to operate in the Atlantic.
1460. U.S. Embassy, Manila, "Bluefin tuna archival tag retrieval: Additional information," message number 14753, November 24, 1999.
1461. Jack C.L. Chen, Senior Specialist, Economic Division, Taipei Economic and Cultural Representative Office in the United States, personal communications, August 30, 2000.
1462. "Chinese delegation visits Cuba," FIS website, http://www.fis-net.com/fis/hotnews/", posted September 4, 1998. While the Chinese and Taiwan Governments are hostile, considerable cooperation exists between companies, including fishing concerns. Large numbers of mainland Chinese are employed as crew members on Taiwan vessels, including the longliners operating out of Port of Spain.
1463. "J. Marr visits Cuba," Fish Info Service, April 4, 1998.
1464. FIS Europe, "AGECREW signs top contract," *op. cit.*
1465. Coral Suki, "Coral Suki S.A.," internet posting accessed October 31, 2000: http://fis.com/coral/pag13.htm
1466. INFOFISH, "Cuba/Spain: New trawlers in operation," *INFOFISH Trade News*, March 15, 1999.
1467. "Acuerdos ...," *op. cit.*, p. 6.
1468. "J. Marr visits Cuba," Fish Info Service, April 4, 1998 and "Renovation hale vessels is underway," Fish Info Service, January 25, 2000.
1469. FAO, "Mejora e incremento de la pesca de atún con palangre," *Informe* No. 2987, 1971, 12 p.
1470. "Cuba," Acuicultura y Pesca, January 1992 and FAO, "Consultoria en Cultivo de Camarón," 1ra mission del 16/07/88 al 17/12/88, 2da misión del 17/05/89 al 17/06/89, *Informe Técnico* serie No. 5., FAO-FI-DP/CUB/86/004, January and August 1989.
1471. Rawlings, "A report on the Cuban tuna fishery," *op. cit.*, p. 10.
1472. Kawaguchi, "Exploratory tuna longline fishing ...," *op. cit.*,pp. 61-62.
1473. Fidel Castro Ruz, Comandante en Jefe, Speech delivered at the Cabañas Naval Base, August 3, 1963, as quoted by Cubamar, internet site accessed November 10, 2000: http://www2.cubamar.cu/anpp/derecha.htm
1474. INP, *La Industria Pesquera en Cuba*, *op. cit.*, p. 30.
1475. FAO, "Mejora y incremento ...," *op. cit.*, p. 1.
1476. "Tuna fish in distant seas," *Bohemia*, January 18, 1974, pp. 22-29.
1477. Kawaguchi, "Exploratory tuna longline fishing ...," *op. cit.*, p. 61.
1478. U.S. Coast Guard, "Enforcement of laws and treaties--Fisheries--Report of gear conflict between US and foreign fishing vessels 45 NM southwest of Dry Tortugas," message number N16240, February 18, 1984.
1479. Details on the Soviet fisheries assistance program are available in Dennis Weidner and Don Jacobson, "Soviet-Latin American fishery relations," *International Fishery Relations* (IFR/89-39), May 5, 1989.
1480. In most cases the Soviets did not actually donate fishing vessels. They were often sold to the Cubans through long-term loans. The Cubans have, however, paid back very little of the real value of these and other loans. The Russians calculate that the Cubans still owe them $20 billion. Most observers doubt if the Russians will ever actually be repaid much of this debt.

1481. INP, *La Industria Pesquera en Cuba*, *op. cit.*, p. 30 and Suárez Caabro, *Cuba y Su Pesca*, *op. cit.*, pp. 59-63. A CIP researcher maintains that the most important Soviet contribution was logistical, such as fuel, spare parts, and support for Cuban distant-water vessels on the highseas such as providing supplies. Rodríguez, *op. cit.*, September 16, 2001.
1482. U.S. Secretary of State, "Seizure of Cuban fishing trawler," message number 198344, August 20, 1975.
1483. See for example: Sokolov and Ramos, "Distribución de los atunes ...," *op. cit.*; Zharov, "Resultado de los ...," *op. cit.*; Sokolov, "Investigaciones sobre el atún ..., *op. cit.*; Sal'nikov, Fishery research ...," *op. cit.*, pp. 78-171; and Zharov, "The Results of the Fourth Exploratory Tuna Expedition ...," *op. cit.*, pp. 172-178.
1484. A detailed assessment of the Soviet-Cuban fishery relationship is available in Dennis Weidner and Don Jacobson, "Soviet-Latin American fishery relations, 1961-89," *International Fishery Reports*, (IFR-89/39), May 5, 1989, pp. 58-66.
1485. Morales, "Transbordo en alta mar," *op. cit.*. pp. 18-19.
1486. Dennis Weidner and David Hall, "Latin America", *World Fishing Fleets*, IV (NMFS: Silver Spring, Maryland, November, 1993), pp. 115-137.
1487. "Government lifts 15-year ban on bilateral aid to Cuba," Montreal Radio Cadena International, 2030 GMT, August 11, 1993.
1488. Kemp, "UNBSJ off to Cuba ...," *op. cit.*
1489. "Canada considers Cuba gear sale," *World Fishing*, January, 1998, p. 2.
1490. "Fishing industry agreement signed with China," Radio Havana, 0000 GMT, October 27, 1992.
1491. Yuri Pavlov, "Russian-Cuban relations: Common interests renew old friendship," *Cuba News*, September, 1993, p. 8.
1492. Queries concerning Cuban-Russian fishery relations were forwarded to Oleg Podolko, Chief of the Commercial Section.
1493. Ubeda, "Why ... tuna ...," *op. cit.*
1494. INP, *La Industria Pesquera en Cuba, op. cit.*, p. 30.
1495. For a U.S. Government estimate see footnote 18.
1496. INP, *La Industria Pesquera en Cuba, op. cit.*, p. 30 and various other sources.
1497. The East Germans built several trawlers for the Cubans. Weidner and Hall, "Cuba," *op. cit.*, p. 136. The authors do not have details on the contractual details and to what extent the East Germans were actually paid for the vessels ordered.
1498. "Training projects," *EC Fisheries Cooperation Bulletin*, September 1991, p. 3.
1499. For a 1970s review of Cuba's African diplomacy, see "Cuban star over Africa," *Africa*, May 1977, pp. 83-85.
1500. "Countries receiving cooperation in fishery field," Havana International Service, 1600 GMT, May 31, 1984; "Fish industry official discusses cooperation agreements," Havana International Service, 0000 GMT, February 11, 1980; and various other radio broadcasts. The Cuban assistance program to the Latin American countries is covered in detail in Thomas and Weidner, "Cuban fishery relations ...," *op. cit.*
1501. Harvey R. Bullis, Southeast Fisheries Science Center, NMFS, "Report of travel to Rome," May 8, 1979.
1502. Justin Rennie, Fisheries Officer, Grenada Fisheries Division, personal communications, September 27, 1999. For greater detail see the Grenada chapter of this report.

SECTION XVII. (Enforcement)

1503. U.S. Consulate General, Nassau, "Cuban fishermen," message number A-115, June 10, 1966.
1504. Dennis Weidner, "Cuban fishermen fined by Bahamian court," *International Fisheries Report* (IFR-76-209), September 16, 1976.
1505. U.S. Embassy, Nassau, "Cuban poachers fined," message number 1431, September 8, 1976.
1506. U.S. Department of State, "Cuban fishing vessel incident," message number 200760, October 10, 1973.
1507. "'Vicious attack' protested," Nassau Domestic Service, 1200 GMT, May 12, 1980 and "Cuba apologizes to Bahamas," *Washington Post*, May 29, 1980.
1508. "Cuban fishermen arrested for 'poaching'," *The Tribune*, December 30, 1985, p. 1.
1509. "Cubans arrested," *World Fishing*, January 1977; "Limits charges against three Cuban vessels," *Fishing News International*, December 1976; and *Washington Post*, January 5, 1977.
1510. "Fishermen tell of mistreatment in Cuba jails," Madrid radio broadcast, EFE, 0325 GMT, Nov. 4, 1977.
1511. "Fishermen detained in Cuba," Santo Domino Radio Mil Network, 1000 GMT, January 26, 1980.

1512. "Cubans arrive in Jamaica in hijacked fishing boat," Bridgetown radio broadcast, CANA, 1815 GMT, July 3, 1982.
1513. "Seizure of Cuban fishing boats," *Novedades de Yucatan*, February 15, 1967.
1514. Jorge Robleda Casares, Delegado Pesquero, Yucatan, personal communications, February 9, 1967. Many Cuban diplomats in the early years of the Revolution were chosen for their commitment to the regime rather than their tact, diplomatic experience, or academic training.
1515. "Cuban fishermen fined for fishing in Mexican waters," Mexico City INFORMEX broadcast, 2110 GMT June 20, 1976.
1516. U.S. Embassy, Mexico, "Mexican Navy seizes Cuban fishing vessel," message num. 16361, Sept. 30, 1977.
1517. "Mexico seizes Cuban trawler," *New York Times*, May 22, 1978.
1518. See for example Coast Guard, "Sitrep one possible violation of CFZ by foreign fishing vessel," message number DCA089, August 19, 1986. Various fisheries were conducted. Baitboats stopped by the U.S. Coast Guard had a catch of sharks and a two dolphins. Morris Pallozzi, Office of Enforcement, NMFS, "Daily teleprinter readout," August 23, 1976.
1519. "... a pesar de la pirateria," *Mar y Pesca*, July 1985, p. 26.
1520. "... a pesar de la pirateria," *op. cit.*, p. 26 and U.S. Department of State, "Cuban fishing vessels," message number 92536, May 26, 1971.
1521. Rose Gotemuller, "Foreign fishing vessel seizures off U.S. coasts," *International Fishery Reports* (IFR-76/124), May 18, 1976.
1522. "... a pesar de la pirateria," *op. cit.*, p. 26.
1523. "Cuban extremists in U.S.: A growing terror threat," *U.S. News and World Report*, Dec. 6, 1976, pp. 29-32.
1524. U.S. Coast Guard, "Surface patrol report: Western Gulf of Mexico--USCGC Point Banker," WPB82342, August 1-2, 1975.
1525. U.S. Secretary of State, "Seizure of Cuban fishing trawler," message number 198344, August 20, 1975 and Dennis Weidner, "Cuban factory trawler seized," *International Fishery Reports* (IFR-75/197), September 29, 1975.
1526. "... a pesar de la pirateria," *op. cit.*, p. 26.
1527. Morris Pallozzi, Office of Enforcement, NMFS, "Daily teleprinter readout," May 11, 1976.
1528. Morris Pallozzi, Office of Enforcement, NMFS, "Daily teleprinter readout," May 17, 1976.
1529. U.S. Embassy, Port-au-Prince, "Missing fishing boat 'Spirit of 76'," message number 2342, August 31, 1976.
1530. "Explican los dos deportistas el incidente con Cuba Roja," *Diario las America,* July 9, 1977.
1531. "Capture of U.S. boat," Buenos Aires radio broadcast, 1847, GMT, July 22, 1977 and "Cubans seize U.S. lobster boat," *The Sun*, July 22, 1977.
1532. "Declaran contra tres Cubanos que huyeron de Cuba en barco," *Diario las Americas*, December 8, 1980.
1533. "Decomisa Cuba un barco con 4 estadounidenses," *Diario las Americas*, January 24, 1981 and "Regresa un barco que había sido retenido en Cuba Roja," *Diario las Americas*, January 28, 1981.
1534. "Apresados dos estadounidenses en Cuba Roja," *Diario las Americas*, April 7, 1984.
1535. U.S. Interests Sec., Havana, "GOC response to Sec. 5 FPA notification," mes. num. 3160, Aug. 15, 1989.
1536. U.S. Interests Section, Havana, "GOC request for return of fishing vessels," message number 5963, September 21, 1992. U.S. Interests Section, Havana, "GOC requests return of boats," message number 6518, October 26, 1992.
1537. Canada has provided Cuba both redfish and hake allocations, but never any cod allocations. Sea Shepherd reports its efforts on the Grand Banks during July 1993 was to confront foreign fleets "over fishing cod and redfish to the point of extinction with the tacit permission of the Canadian Government." The Sea Shepherd release goes on to claim that 10 Cuban trawlers then withdrew from the fishery. Sea Shepherd Conservation Society, "History", internet site assessed August 13, 2001: http://www.seashepherd.com/aboutus/chronology/chronology.html
1538. U.S. Interests Section, Havana, "Return of Cuban vessel Plástico 11," message number 3412, June 1, 1994.
1539. Vicente Cubillas, "Alecrín: Una actitud heroica ante un acto piratesco," *Mar y Pesca*, November-December 1968, numbers 38-39, pp. 4-7.
1540. Cuban accounting standards even today are not fully understood. Even if state companies keep better financial records, however, the question of pricing in a controlled economy becomes a very complicated problem which in the end makes calculating reasonable production costs and thus profits and losses very difficult.

SECTION XIX. (Special Note)

1541. Cuban Government, "Pueblo de Cuba versus gobierno de U.S.A.," retrieved June 20, 2000: http://www.cubademanda.cu/testimonios/tes313.htm

Appendices

Series A: Fleet
Series B: Biological data
- B1: Yields
- B2: Sex
- B3: Lengths
- B4: Depths
- B5: Feeding
- B6: Ovaries

Series C: Catch
- C1: Overall fisheries catch
- C2: Overall pelagic catches
- C3: Flota Atunera de Cuba catches
- C4: Cuban fleet catches
- C5: Tournament results
- C6: Large pelagic catches
- C7: Large pelagic catches by area
- C8: Swordfish catches
- C9: Tuna catches
- C10: Billfish catches
- C11: Shark catches

Series D: Consumption
Series E: Trade
- E1: Overall fisheries
- E2: Overall swordfish
- E3: EU
- E4: Japan
- E5: United States

Series F: Bycatch
- F1: U.S. Gulf of Mexico data
- F2: Turtles
- F3: Seabirds

Series G: Glossaries

Appendix A1.--Cuba. Fishing Vessels, 1972-1992.

Year	Longliner#				Bait boat		Purse seiner	Unclassified	Total
	0-50	51-200	201-500	>500	Icewell	Freezer			
					Number of vessels				
1971*									
1972	-	-	-	23	NA	-	1	-	NA
1973	-	-	-	23	43	-	1	-	67
1974	-	-	-	23	44	-	1	-	68
1975	-	-	-	23	44	-	1	-	68
1976	-	-	-	23	61	-	1	-	85
1977	-	-	4	20	46	-	1	-	69
1978	-	-	4	20	74	-	1	-	99
1979	-	-	4	20	69	-	1	-	94
1980	-	-	3	19	70	-	1	-	93
1981	-	2	3	18	65	-	1	-	89
1982	60***	2	3	18	67	-	1	-	151
1983	-	9##	-	18	59	-	1	50****	137
1984	-	13##	-	18	60	-	1	-	92
1985	-	3	-	14	59	-	1	-	77
1986	-	-	-	10	56	-	1	-	67
1987	-	-	-	10	59	-	1	-	70
1988	-	-	-	14	55	-	1	-	70
1989	-	-	-	10	55	-	1	-	66
1990**	NA	NA	NA	NA	NA	NA	NA	NA	NA
1991	NA	NA	NA	NA	NA	NA	NA	NA	NA
1992	NA	NA	NA	NA	NA	NA	NA	NA	NA
1993	NA	NA	NA	NA	NA	NA	NA	NA	NA
1994	NA	NA	NA	NA	NA	NA	NA	NA	NA
1995	NA	NA	NA	NA	NA	NA	NA	NA	NA
1996	NA	NA	NA	NA	NA	NA	NA	NA	NA

NA - Not available
GRT classes
These medium-range vessels were 30-m long and their operations mentioned in A. Rodríguez, "Una revisión de las pesquerias de tunidos en aguas Cubanas," *Collected Volume of Scientific Papers* (SCRS/88/29) Vol. XXX (ICCAT: Madrid, 1989), p. 462-469.
* Cuban did not report fleet data to ICCAT until 1972.
** Cuba has not reported fleet data to ICCAT since 1989.
*** NMFS is not sure why Cuba reported the number of small artisanal longliners only in 1982. This number should not be considered a 1982 development, but rather the number of artisanal longliners that had been operating for several years.
**** NMFS is unsure just what kind of vessels these were and why Cuba just reported on them in one year.
Source: ICCAT, *Statistical Bulletin*, various years.

Appendix A2.--Cuba. Artisanal longline vessels, 1984-87

Type	Hull	Length	Beam	Depth	Autonomy	Crew
			Meters		Days	Members
Ferro-cemento VI	Ferro-cement	16.2	4.9	1.9	8	3
Sigma	Wood	10.1	3.2	1.2	1	2
Criollo C	Wood	8.5	2.9	1.1	1	2
Sondero	Wood	21.6	5.8	-	9	4
Jaruco	Wood	9.8	3.2	1.1	1	2

Source: S. Moreno, J. Pol, and L. Muñoz, "Influencia de la luna en la abundancia del emperador," *Collected Volume of Scientific Reports* SCRS/90/45, Vol. XXXV, (ICCAT: Madrid, 1991), p. 510.

Appendix A3a.--Cuba. Characteristics of the Delfín-class longliners acquired in Japan, 1962-63

Characteristic	Measurement
Size	386 GRT
Length	47 meters*
Engine	700 horsepower
Speed	11.5 knots
Range	90 days
Freezer	-35°C
Hold	-18°C
Freezing line	8-10 t of fish per day

* One source reports 41 meters.
Source: V.A. Sokolov y Hector Ramis Ramos, "Distribución de los atunes en el Atlántico occidental y central," *Contribuciones: Instituto Nacional de la Pesca Cuba/Centro de Investigaciones Pesqueras.* (Investigaciones Atuneras Cubanas-Sovieticas), October, 1967, Nos. 23-26, combined issue, p. 32.

Appendix A3b.--Cuba. Flota Atunera de Cuba (FAC) fleet, 1995

Type	Vessels
	Numbers
Longliners	10
Purse seiners	1
Tanker	1
Repair/service	1
Tug	1
Total	14

Source: Ministerio de Pesca, anonymous source, May 21, 1995.

Appendix A4a.--Cuba. Tuna longline fleet, vessel classes, 1970

Type/Vessel classes	Source	Year	Number	Hull	Size: Gross	Size: Displacement	Hold	Length	Endurance
					GRT	Tons	Tons	Meters	Days
High seas									
Anchoa	Spain	1965-67	18-20	Steel	705	575		50-55	
Atún**	Spain	1961-62	2		509				
Castero	Spain	1964-66*	3	Steel	370	~1,100	330-343	55	105
Delfín	Japan	1962	5	Steel	387			41-47	
Jagua***	Spain	1965	1	Steel			586		
Coastal									
Lamda-75			1	Wood		97	30	23	
Golfo-65			1	Wood		84	18	18	
Unknown			(1)#	Wood		50	NA	20	
Total			51						

* Other sources indicate that some of these vessels were acquired in 1963.
** The authors have few details on these vessels, but because of the name, believes they may have been longliners.
*** Purse seiner
\# Not counted in the total.
Source: FAO, "Mejora e incremento de la pesca de atun con palangre: Informe al gobierno de Cuba," *Informes*, Nº 2987 (FAO: Rome, 1971), p. 1 and 12; José A. Suárez Caabro, *El Fracaso de FLOCUBA: Orto y Ocaso de la Flota Cubana de Pesca* (Miami: 1994), pp. 61-62 and 64; and various other sources.

Appendix A4b.--Cuba. Fleet plans, 1966-70

Class	Built	Hold	Range	Year				
				1966	1967	1968	1969	1970
		M. tons	Days	Number of vessels				
Delfín	Japan	222	90	5	5	5	5	5
Spain	Castero	330	70	1	1	1	1	1
Spain	Anchoa	312	100	7	20	20	20	20
Spain	NA*	230-250	90-100	-	-	7	38	43
Total				13	26	33	54	69

* These longliners were never built. When FAC was not able to achieve anticipated results with the Anchoa-class longliners, MIP officials decided to cancel additional investments in longliners.
Source: Comisión Plan Perspectivo as cited in Manuel Achurra Larrain, "Los antecedentes del plan perspectivo pesquero, 1966-1970," *Informe al Gobierno de Cuba* (FAO: Rome, 1967), p. 94.

Appendix A4c.--Cuba. Commercial longliners#, 1960-99

Year	Commercial longliners	Year	Commercial longliners
	Number of vessels		
1960	-	1980	22
1961	1	1981	21
1962	1E	1982	21
1963	7E	1983	18
1964	6	1984	18
1965	9E	1985	14
1966	13	1986	10
1967	26	1987	10
1968	26	1988	14
1969	26	1989	10
1970	25E	1990	10E**
1971	24E	1991	9E
1972	23	1992	9E
1973	23	1993	7E
1974	23	1994	3E
1975	23	1995	3E***
1976	23	1996	3E
1977	24*	1997	1E
1978	24	1998	1
1979	24	1999	-***

E - Estimated by NMFS on the basis of catch trends or other data.
NA - Not available
* Cuba reported only 20 large longliners in 1977. They also reported 3-4 longliners in the 201-500 category from 1977-82. This may be a reclassification of existing vessels rather than the retirement and acquisition of smaller vessels.
** Cuba stopped reporting vessel data to ICCAT.
*** At least one longliner was still active, working with a Bermuda joint venture. Neil Inchcup, Seamont Fisheries (Bermuda), personal communication, June 9, 2000.
*** Cuban officials reported that all of Cuba's commercial longline fleet had been retired, either sold are deployed in other fisheries. Julio Baisre, MIP, personal communications, October 9, 2000.
**** One Cuban source reported that FAC still had 10 longliners in 1995 (appendix A3b). Based on catch data, only about 3 of those vessel
# Longliners 501 GRT or larger. Size category 201-500 GRT was included 1977-82 as the Cubans may have reclassified some of their longliners.
Sources: Various sources (1960-71 data) and ICCAT, *Statistical Bulletin* (1972-89 data); NMFS estimates (1990-98); and Julio Baisre, MIP, personal communications, October 9, 2000 (1999 data).

Appendix A5a.--Cuba. Vessels in the Cuban longline fleet, 1970

Operator/ vessel name	Class	Operator/ vesse name	Class
FCP			
Aguja	Delfín class (1963)	Liseta	Anchoa class (1966-67)
Aguaji	Delfín class (1963)	Machuelo	Anchoa class (1966-67)
Albacora	Delfín class (1963)	Marlina	Castero class (1963)
Alecrín	Anchoa class (1966-67)	Medregal	Anchoa class (1966-67)
Anchoa	Anchoa class (1966-67)	Merluza	Anchoa class (1966-67)
Arenque	Anchoa class (1966-67)	Mero	Anchoa class (1966-67)
Arigua	Anchoa class (1966-67)	Pargo	Anchoa class (1966-67)
Bajonao	Anchoa class (1966-67)	Rascasio	Anchoa class (1966-67)
Bonito	Castero class (1964)	Robalo	Anchoa class (1966-67)
Castero	Castero class (1964)	Sierra	Anchoa class (1966-67)
Cubera	Anchoa class (1966-67)	Victoria 122	
Damero	Anchoa class (1966-67)	Unknown*	
Delfín	Delfín class (1963)	CIP	
Dorado	Delfín class (1963)	Magro	Lamda-75
Emperador	Anchoa class (1966-67)	Ro-Sesi**	
Jagua	Purseseiner	Sabdaro	
Joturo	Anchoa class (196-67)	Sama	Golfo-65
Jurel	Anchoa class (1966-67)		

* The FCP operated a few additional Anchoa-class longliners, but we do not have the vessel names.
** FAO officials suggested the Ro vessels not be used in even the coastal fishery as they were less stable than the Lamda and Golfo class vessels.
Source: FAO, "Mejora e incremento de la pesca de atun con palangre: Informe al gobierno de Cuba," *Informes*, No. 2987 (FAO: Rome, 1971), pp. 1, 4, and 12 and various other sources, primarily *Mar y Pesca*.

Appendix A5b.--Cuba. Large* fishing vessels, 1993.

Vessel class\Vessel type Vessel name	Size	Constructed
	GRT	Year
Anchoa (Longliners)		
Alecrin	705	1966
Arigua	705	1965
Bajonao	705	1966
Cubera	705	1966
Damero	705	1965
Joturo	705	1965
Jurel	705	1966
Liseta	705	1966
Machuelo	705	1966
Medregal	705	1966
Merluza	705	1966
Mero	705	1966
Pargo	705	1966
Rascasio	705	1966
Robalo	705	1965
Sierra	705	1966
Atun (Unknown**)		
Atun	509	1961
Marlina	508	1962
Castero (Unknown**)		
Castero	621	1963
Cubanacan (Tuna vessel***)		
Baracoa	814	1976
Guama	814	1976
Yara	814	1976

* 500 GRT or greater.
** Identified as refrigerated trawler, but the ONI identification of fishing vessel types was often inaccurate.
*** Although identified as tuna vessels, this was probably an error.
Source: U.S. Navy. Office of Naval Intelligence. Washington, D.C., 1993.

Appendix A5c.--Cuba. Characteristics of representative vessels used for longlining, 1967-70

Vessel name	Hull	Length	Width	Draft	Displacement	Hold	Speed	Engine	Crew
	Material	Meters			Tons		Knots	HP	Number
Artisanal									
Magro*	Wood	23.3	6.3	2.5	97.2	29.5	10.5	250	14
Sama**	Wood	18.4	5.3	2.2	83.8	18.0	8.5	150	12
Ro-Sensi	Wood	20.1	5.2	1.8	49.6	NA	8.5	150	11
Mid-range									
Victoria 122	Wood	37.4	7.9	3.1	419.6	100.0	11.0	540	26
Distant-water									
Bonito***	Steel	55.3	9,0	3.8	1,100.0	343.0	10.5	1,300	39

Note: The *Magro*, *Sama*, and *Ro-Sensi* were operated by the fisheries research institute--CIP. The *Victoria 122* and *Bonito* were longliners operated by the distant-water fleet--the FCP.
NA- Not available
* Lambda-75 class
** Golfo-65 class
*** Anchoa class
Source: FAO. "Mejora de la pesca de atún con palangre," *Informe de Gobierno de Cuba*, NºAT2987, (Rome: UNDP, 1971), p. 12.

Appendix A6a.--Cuba. Tuna fishing plan, 1966-70

Entry	Year				
	1966	1967	1968	1969	1970
			Days		
Cycle	4,745	9,489	12,045	19,711	25,185
In port	1,281	2,562	3,252	5,322	6,800
At sea	3,464	6,927	8,793	14,389	18,385
Traveling	854	1,708	2,168	3,548	4,533
Working	2,610	5,219	6,625	10,841	13,852
Actual fishing	2,300	4,460	5,611	9,264	11,837
Other	380	759	964	1,577	2,015

Source: Comisión Plan Perspectivo as cited in Manuel Achurra Larrain, "Los antecedentes del plan perspectivo pesquero, 1966-1970," *Informe al Gobierno de Cuba* (FAO: Rome, 1967), p. 96.

Appendix A6b.--Cuba. Flota Atunera de Cuba fishing effort, 1978

Activity	Plan	Actual	Difference
	Days		
At sea			
Fishing	3,615	3,727	+112
Other	1,790	1,801	+ 11
Total	5,405	5,528	+123
In port			
Repairs	1,683	1,527	-156
Other	212	245	- 33
Total	1,895	1,772	-123

Source: Flota Atunera de Cuba in Jorge Julio González, "Flota Atunera de Cuba 1978: La Palabra Cumplida," *Mar y Pesca*, July 1979, no. 164, p.22.

Appendix A7.--World. Selective fishing fleet production efficiencies, 1975*

Country	Fishing fleets			Catch	Productivity
	Fishing*	Carriers	Total		
		1,000 GRT		1,000 Metric tons	Catch MT/Fleet GRT
Iceland	83.6	-	83.6	1,514.9	18.1
Taiwan	62.7	-	62.7	934.3	14.9
Canada	138.8	0.4	139.2	1,347.2	9.7
USA	387.6	10.6	398.2	3,634.5	9.1
Korea	205.0	30.0	235.0	2,091.1	8.9
Japan	1,030.4	186.2	1,216.6	10,435.6	8.6
Cuba	81.2	-***	81.2	186.5	2.3#
Spain	536.7	13.3	549.7	1,264.7	2.3##
USSR	2,996.8	2,940.6	5,937.4	9,475.8	1.6

* The authors have chose 1975 for this calculation because it was 1 year before FLOCUBA made massive investments in the Rio Damuji-class of trawlers. FLOCUBA thus had access to this data as well as much more detailed data from their own fleet operations.
** Vessels over 100 gross registered tons (GRT).
*** Cuba did have carrier vessels, but for unknown reasons they were not listed in Lloyd's.
# The catch/fleet GRT for Cuba is extremely low, suggesting very inefficient operations. If the GRT of the Cuban carrier vessels and the relatively large fleet of small coastal vessels was included, the Cuban performance would be even worse.
The authors were surprised by the apparent low productivity of the Spanish fleet and are unsure what factors were involved.
Note: Comparing fisheries catch efficiencies of various national fishing fleets is of course a much more complicated matter than the simple comparisons suggested by the data above. There are many complications. Not included, for example, large numbers of small fishing boats under 100 GRT in some countries like Canada and the United States. The authors have discussed the significance of this data with other fishery analysts. Some contend that the comparison is not valid because these fleets were often fishing in different areas, for different kinds of fish and for very different markets (compare the price of fish in Japan with the Soviet Union). And the Japanese fleets were not completely unsupported by their government. The authors agree that the above table is a very crude statistical measure and that the topic requires a much more detailed investigation. Of course the authors can only work with data that is available. The Soviets were not willing to provide financial data for objective financial scrutiny. In fact, the Soviets and Japanese did fish some identical grounds: the north Pacific was a major fishing ground for both countries. In distant-water fisheries it was management decisions that were responsible for what and how the two fleets operated and what species they targeted. It is a telling fact that the Japanese went after high-value species like tuna and swordfish and the Soviets targeted many low-value species like jack mackerel. (It is no accident that the decision to go after the high-value species was made by private companies and the decision to go after a low-value species like jack mackerel, a fishery which did not begin to cover even operating costs was made by Soviet state-owned companies). Even if in fact the comparison is distorted by the factors mentioned, all of the possible distortions could not explain building a fleet FIVE times as large as the Japanese fleet. It should be stressed that the costs involved in such a fleet is not only actual construction costs, but all the attenuating costs associated with operating a huge fleet on distantwaters. Despite the inadequacies of this data, it does suggest gross inefficiencies in Soviet and Cuban fishing operations. The authors stress that not only was the Soviet fishing fleet less efficient at catching fish, but the species caught were generally less valuable than those taken by counties like Japan and the final processed product of inferior quality. Other factors such as less fuel-efficient engines contributed to the staggering inefficiencies in Soviet and Cuban fishing operations.
Sources: Lloyd's of London (vessel data), FAO, *Yearbook of Fishery Statistics* (catch data).

Appendix A8.--Cuba. Crews aboard different longliners

Position	Longliners	
	Japanese*	Spanish*
	Number of persons	
Captain		
Fishing	1	1
Navigation	1	1
Officers	3	2**
Boatswain	1	1
Radioman	1	1
Cook	2	NL
Technicians		
Engines	5	4
Refrigeration	2	2
Other	1	-
Crew	30	26
Total	47	38

NL - Not listed
* Country of construction/** Pilots
Source: José Suárez Caabro, *El Fracaso de FLOCUBA* (Miami: 1994), pp. 83-84.

Appendix A9.--Cuba. Planned longline fleet production data, 1966-70

Item	Year				
	1966	1967	1968	1969	1970
	Metric tons				
Catch					
Per day at sea	2.4	2.4	2.5	2.7	2.8
Per fishing day	2.8	2.8	3.0	3.1	3.3
Per trip	173.0	173.0	181.0	191.0	200.0
Per vessel year	484.0	484.0	508.0	534.0	561.0
Production					
Per trip	154.0	145.0	162.0	170.0	179.0
Per vessel year	432.0	432.0	454.0	477.0	501.0

Note: These were the plans for the Cuban tuna fleet. They were set below levels achieved by the Japanese on the same ground, but Cuban fishermen failed to even approach these levels. Japanese longliners produced about 700 t annually. Manuel Achurra Larrain, "Los antecedentes del plan perspectivo pesquero," *Informe al Gobierno de Cuba* Nº AT 2268 (FAO: Rome, 1967), p.94. The Cubans even as late as 1973 were only reporting longline catches of about 300 t per vessel. "Tuna fish in distant seas," *Bohemia*, January 18, 1994, p. 22. Similar articles in *Mar y Pesca* show comparable results for other Cuban longliners. See for example Luis Ubeda, "But ... why does Cuba have a tuna fishing fleet," *Mar y Pesca*, No. 100, January 1974, NMFS Language Services Translation.
Source: Comisión Plan Perspectivo as cited in Manuel Achurra Larrain, "Los antecedentes del plan perspectivo pesquero, 1966-1970," *Informe al Gobierno de Cuba* (FAO: Rome, 1967), pp. 93-94.

Appendix A10a.--Cuba. Tuna fleet, planned production and value, 1966-70

Item	Catch	Year				
		1966	1967	1968	1969	1970
	Percent			Cuban pesos*		
Catch						
Tuna	73	4,592	9,181	12,235	21,031	28,257
Billfish**	17	1,069	2,138	2,849	4,898	6,580
Shark	5	314	629	838	1,441	1.935
Other	5	314	629	838	1,441	1,935
Total		6,289	12,577	16,760	28,811	38,707
Landings						
Tuna	NA	4,133	8,263	11,011	18,928	25,431
Billfish**	NA	962	1,924	2,564	4,408	5,922
Shark	NA	242	484	645	1,100	1,490
Other	NA	283	566	754	1,297	1,741
Total		5,620	11,237	14,974	25,733	34,584

NA - Not available
* Although expressed in Cuban pesos much of the catch was destined for export markets. The inconvertibility of the Cuban pesos makes it difficult to convert to U.S. dollars. The relative importance of the species, however, provide valuable insights on Cuban planning. The low shark bycatch planned is particularly notable.
* Believed to include swordfish
Source: Comisión Plan Perspectivo as cited in Manuel Achurra Larrain, "Los antecedentes del plan perspectivo pesquero, 1966-1970," *Informe al Gobierno de Cuba* (FAO: Rome, 1967), p. 98.

Appendix A10b.--Cuba. Planned value of the tuna fleet, 1966-70

Item	Anticipated prices	Earnings*				
		1966	1967	1968	1969	1970
	CP$/metric ton			CP$1,000		
Tuna	616	2,546	5,090	6,783	11,660	15,665
Billfish**	783	753	1,506	2,008	3,451	4,637
Shark***	478	116	231	308	531	712
Other	706	200	400	532	916	1,229
Total	NA	3,615	7,227	9,631	16,557	22,244

CP - Cuban pesos. See note on Cuban pesos in appendix A10a.
NA - Not available
* Based on production planned in appendix A10a
** Believed to include swordfish
*** Cuban planners based fleet earnings on a shark bycatches of only 5 percent. The actual bycatch proved much higher (appendix C4b1). Thus a larger percentage than anticipated were of the lowest value species. In addition, the earnings from shark noted here was probably based on marketable species like makos. Based on the proportion actually caught, the Cubans retained many sharks of limited commercial value and the $479 per t estimate above was probably unrealistic--further reducing actual earnings.
Source: Comisión Plan Perspectivo as cited in Manuel Achurra Larrain, "Los antecedentes del plan perspectivo pesquero, 1966-1970," *Informe al Gobierno de Cuba* (FAO: Rome, 1967), p. 98.

Appendix A11a.--Cuba. Tuna fleet planned costs, 1966-70

Item	Proportion	Year				
		1966	1967	1968	1969	1970
	Percent	1,000 Cuban pesos*				
Materials	23	1,246	2,328	2,878	4,679	5,516
Fuel	11	574	1,172	1,424	2,294	2,914
Repairs	14	772	1,482	1,882	2,964	3,861
Salaries	26	1,437	2,883	3,450	5,463	6,714
Depreciation	11	610	1,000	1,278	2,109	2,712
Social security	3	144	283	345	546	671
Sub-total	88	4,783	9,099	11,257	18,054	22,389
Shipping**	4	239	455	563	903	1,119
Insurance	8	425	425	630	850	850
Total		5,447	9,979	12,450	19,807	24,358

* Although expressed in inconvertible Cuban pesos, making it difficult to convert to U.S. dollars, the relative importance of the above operating costs provide valuable insights on Cuban planning and fleet operations.
** Shipping, unloading, and administration.
Source: Comisión Plan Perspectivo as cited in Manuel Achurra Larrain, "Los antecedentes del plan perspectivo pesquero, 1966-1970," *Informe al Gobierno de Cuba* (FAO: Rome, 1967), p. 99.

Appendix A11b.--Cuba. Operating costs of a pilot artisanal longliner, April-October 1962

Period	Costs			
	Gas	Oil	Bait	Ice
	Cuban pesos			
Apr 13-May 06	24.90	1.38	28.77	3.02
May 07-Jun 05	49.35	1.71	59.93	5.03
Jun 06-Jul 07	68.85	2.00	103.36	8.01
Jul 11-Sep 18	82.43	3.04	234.07	15.10
Sep 19-Oct 25	65.27	1.52	139.18	10.21
Total	290.80	10.55	565.31	41.37

Note: The author noted that economic data was not available from the cooperative, so he compiled this data for the operation of the pilot boat used by the researchers.
Source: Dario Guitart-Manday, "Biologia pesquera del emperador o pez espada, (*Xiphias gladius* Linnaeus (Teleostomi: Xiphiidae) en aguas de Cuba," *Poeyana*, 1964, Serie B, No. 1, p. 31.

Appendix A12.--Cuba. Shipyard construction, 1960-79

Length/ Hull	Period				Total
	1960-64	1965-69	1970-74	1975-79	
	Number of vessels				
Small boats (under 10 meters)					
Steel	-	2	57	-	59
Ferro-cement	-	-	1	-	1
Fiberglass	-	-	1,231	4,666	5,897
Wood	120	1,226	1,560	-	2,906
Total	120	1,228	2,849	4,666	8,863
Medium boats (over 10 meters)					
Steel	-	8	60	104	172
Ferro-cement	-	-	280	660	940
Fiberglass	-	-	-	8	8
Wood	393	313	72	2	780
Total	393	321	412	774	1,900
Total--All boats					
Steel	-	10	117	104	231
Ferro-cement	-	-	281	660	941
Fiberglass	-	-	1,231	4,674	5,905
Wood	513	1,539	1,632	2	3,686
Total	513	1,549	3,261	5,440	10,763

Source: MIP statistics as reported in Dragovich, Alexander. "Trip report--CIP meeting in Cuba--October 23-27, 1981," November 10, 1981.

Appendix B1a1.--Cuba. Catch per unit effort in the artisanal longline fishery, 1981-84

Month	Sets				
	Nocturnal#	Diurnal##			
		1981	1982	1983	1984
		CPUE*			
January	15	-	-	-	-
February	13	-	-	-	-
March	14	-	-	-	-
April	14	-	-	-	-
May	10	-	-	-	-
June	11	180	165	90	50
July	12	140	105	100	80
August	15	160	120	130	90
September	12	180	155	110	75
October	16	150	75	70	-
November	13	-	-	-	-
December	12	-	-	-	-

Note: Actual data set not available, numbers estimated from a graphic.
The data is thus not precise, but does show trends.
Primarily swordfish
Primarily billfish
* CPUE is measured in kilograms of swordfish per 100 hooks. This is specified for the diurnal sets, but not for nocturnal sets.
Source: Sonia Moreno and Jorge P. Pol, "Contribución al estudio de las pesquerías con palangre de deriva en la costa noroccidental de Cuba," CIP, *I Cong. Cienc. Cuba*, Havana, 1985, pp. 195-196.

Appendix B1a2.--Cuba. Catch per unit effort (CPUE) in the artisanal longline fishery, various species, 1981-84

Species	Sets	Year			
		1981	1982	1983	1984
		Kg/100 hooks			
Swordfish	Nocturnal	11.4	12.4	12.9	14.1
	Diurnal	8.1	6.2	3.4	1.7
Billfish	Nocturnal	5.3	2.1	2.5	3.0
	Diurnal	93.1	87.1	59.8	50.9
Shark	Nocturnal	42.4	42.8	44.8	49.1
	Diurnal	59.1	33.5	30.2	20.4
Tuna	Nocturnal	0.4	0.9	1.5	3.2
	Diurnal	3.1	2.2	7.0	8.1
Other	Nocturnal	2.2	3.9	2.5	3.3
	Diurnal	0.2	1.9	1.4	0.7
Total	Nocturnal	61.8	62.2	64.3	72.6
	Diurnal	163.7	131.0	101.8	82.0

CPUE - Catch per-unit-effort in kg/100 hooks.
Source: Sonia Moreno and Jorge P. Pol, "Contribución al estudio de las pesquerías con palangre de deriva en la costa noroccidental de Cuba," CIP, *I Cong. Cienc. Cuba*, Havana, 1985, p. 197.

Appendix B1a3.--Cuba. Yields (catch per unit effort) in the artisanal longline fishery, all species, 1981-84

Year	Sets	
	Diurnal#	Nocturnal##
	CPUE*	
1981	164	62
1982	131	62
1983	102	64
1984	82	73

Mostly billfish
Mostly swordfish
Source: Sonia Moreno and Jorge P. Pol, "Contribución al estudio de las pesquerías con palangre de deriva en la costa noroccidental de Cuba," CIP, *I Cong. Cienc. Cuba*, Havana, 1985, p. 197.

Appendix B1a4.--Cuba. Artisanal billfish* yields, 1971-79

Year	Catch
	Kg/day
1971	27.3
1972	44.2
1973	44.9
1975	13.3
1976	NA
1977	NA
1978	NA
1979	2.1

* Marlins and sailfish
Source: Darío J. Guitart, Mar Juárez, and José D. Milera, "Análisis de las pesquerías deportivas de Agujas (Pisces; géneros *Istiophorus, Tetrapturus, Makaira*) en la región noroccidental de Cuba," *Ciencias Biológicas*, June 1981, p. 137.

Appendix B1b1.--Cuba. Monthly swordfish yields (catch per unit effort) in the artisanal longline fishery, 1984-87

Month	Nocturnal sets
	CPUE*
January	16
February	13
March	14
April	14
May	10
June	11
July	12
August	15
September	12
October	16
November	13
December	12

Note: The actual data was not included in the source. The authors have estimated these data points from a graphic (figure 2) in the source.
* CPUE measure--kilograms per 100 hooks.
Source: Sonia Moreno and Jorge P. Pol, "Contribución al estudio de las pesquerías con palangre de deriva en la costa noroccidental de Cuba," CIP, *I Cong. Cienc. Cuba*, Havana, 1985, pp. 195-196.

Appendix B1b2.--Cuba. Monthly swordfish yields (CPUE--catch per unit effort) in the artisanal longline fishery, 1984-87

Month	Sets	
	Nocturnal	Diurnal
	CPUE*	
January	18.1	-
February	14.1	-
March	11.2	-
April	9.1	-
May	7.7	-
June	7.0	2.4
July	7.6	1.2
August	11.9	2.3
September	13.7	7.1
October	20.3	4.2
November	16.5	-
December	14.5	-

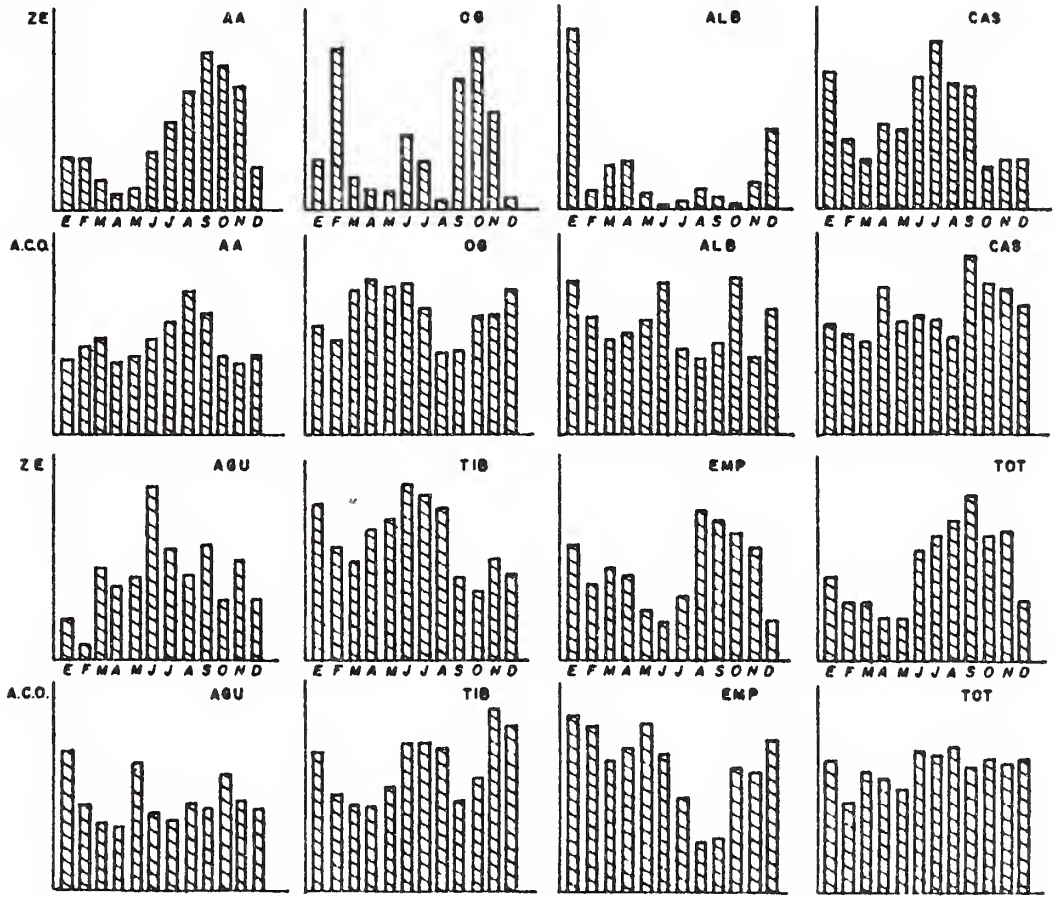
* CPUE measure per 100 hooks.
Source: S. Moreno, J. Pol, and L. Muñoz, "Influencia de la luna en la abundancia del emperador," *Collected Volume of Scientific Reports* SCRS/90/45, Vol. XXXV, 1991, p. 510.

Appendix B1c.--Cuba. Monthly swordfish catches in the artisanal longline fishery, 1971-73

Month	Catch		
	1971	1972	1973
		CPUE*	
January	15	31	65
February	28	52	87
March	25	53	62
April	30	72	48
May	11	50	35
June	6	12	33
July	14	9	10
August	19	12	20
September	23	23	20
October	30	13	14
November	59	89	44
December	13	43	NA

Note: The actual data was not included in the source. The authors have estimated these data points from a graphic (figure 27) in the source. While the resulting numbers are not precise they do show the relative seasonal variations.
NA - Not available
* CPUE measure in kg/day.
Source: Dario Guitart Manday, "La pesquerias pelagico-oceanicas de corto radio de accion en la region noroccidental de Cuba," *Serie Oceanologica*, No. 31, 1975, p. 25.

Appendix B1d.--Cuba. Seasonal catch indices in the eastern central Atlantic and Cuban EEZ longline fisheries.



Key: Fishing areas
ZE - Cuban EEZ
ACO - Eastern central Atlantic
Species
AA - Yellowfin
AGU - Billfish except blue marlin
ALB - Albacore
CAS - Blue marlin
EMP - Swordfish
OG - Bigeye
TIB - Shark
TOT - Total

Source: A. Rodríguez, S. Nieto, and P.O. Castro, "Aspectos comparativos de la pesqueria cubana se tunidos y afines en el Atlántico centrorinental y centroccidental," *ICCAT Collective Volume of Scientific Papers* (SCRS/90/60), Vol. 35 (ICCAT: Madrid, 1991), p. 175

Appendix B2.--Cuba. Swordfish sexual distribution,* 1984-86

Sex	1984				1985				1986				Total
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
						Individuals							
Males	NA	17	85	30	33	25	15	NA	43	28	7	NA	283
Female	NA	4	11	17	23	9	4	NA	17	19	3	NA	107
Total	NA	21	96	47	56	34	19	NA	60	47	10	NA	390

NA - Not available
* Fish taken in the artisanal fishery off northwestern Cuba.
Source: L. Muñoz, S. Moreno, A. Rodríguez, and J. Pol, "Características biológico-pesqueras del emperador (*Xiphias gladius*) en el noroccidente de Cuba," *Revista Cubana de Investigaciones Pesqueras*, 1990, Vol. XV, No. 1-4, p. 51.

Appendix B3a.--Cuba. Average swordfish length,* 1984-86

Sex	Length**			Overall
	1984#	1985	1986	
		Centimeters		
Males	139.8	139.2	138.4	139.2
Female	139.6	158.5	153.0	150.1
Total***	139.1	144.2	143.1	141.0

* Horquillo
** Fish taken in the artisanal fishery off northwestern Cuba.
*** Males, females, undetermined, and unknown.
# The 1984 results are unusual as males in a given area are usually much smaller than the females.
Source: L. Muñoz, S. Moreno, A. Rodríguez, and J. Pol, "Características biológico-pesqueras del emperador (*Xiphias gladius*) en el noroccidente de Cuba," *Revista Cubana de Investigaciones Pesqueras*, 1990, Vol. XV, No. 1-4, p. 51.

Appendix B3b.--Cuba. Gonadal development of swordfish taken in the artisanal fishery,* 1984-86

Sex	1984				1985				1986				Total**
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
						Percent							
Males													
Immature	NA	100	100	97	90	95	100	NA	100	100	100	NA	96
Mature	NA	-	-	3	10	5	-	NA	-	-	-	NA	3
Female													
Immature	NA	100	100	83	70	62	100	NA	83	74	100	NA	80
Mature	NA	-	-	17	30	36	-	NA	17	26	-	NA	20

NA - Not available
* Fish taken in the artisanal fishery off northwestern Cuba.
** Totals may not agree due to rounding
Source: L. Muñoz, S. Moreno, A. Rodríguez, and J. Pol, "Características biológico-pesqueras del emperador (*Xiphias gladius*) en el noroccidente de Cuba," *Revista Cubana de Investigaciones Pesqueras*, 1990, Vol. XV, No. 1-4, p. 52.

Appendix B3c.--Cuba. Swordfish taken by artisanal fishermen off northwestern Cuba, by size and sex May 1984-April 1985

Size	Warm season*			Cool season**			Total		
	Female	Male	Total#	Female	Male	Total#	Female	Male	Total#
Centimeters					Number				
80-89	-	1	2	-	-	1	-	1	3
90-99	1	1	6	-	1	2	1	2	8
100-109	1	1	2	2	3	5	3	4	7
110-119	2	7	11	5	6	11	7	13	22
120-129	2	23	27	8	6	14	10	29	41
130-139	7	30	37	4	13	17	11	43	54
140-149	4	22	26	2	12	14	6	34	40
150-159	1	8	9	4	15	19	5	23	28
160-169	-	3	3	3	5	8	3	8	11
170-179	1	6	7	1	3	4	2	9	11
180-189	1	-	1	1	3	4	2	3	5
190-199	-	1	1	2	-	2	2	1	3
200-209	-	2	2	4	3	7	4	5	9
210-219	-	-	-	1	-	1	1	-	1
220-229	-	-	-	1	-	1	1	-	1
230-239	-	1	1	1	-	1	1	1	2
240-249	-	-	-	1	-	1	1	-	1

* May-October 1984
** November 1984-April 1985
# Includes unidentified individuals.
Source: L. Espinosa, M. Sosa, S. Moreno, and R. Quevedo, "Aspectos biologicos de los peces de pico en la region noroccidental de Cuba," *ICCAT Collective Volume of Scientific Papers*, Vol. 28 SCRS/87/22 (Madrid: ICCAT, 1988), pp. 275.

Appendix B4a.--Cuba. Vertical distribution of swordfish taken in the artisanal longline fishery, 1961-63

Depth	1961-62				1962-63			
	Females	Males	Total	Proportion	Females	Males	Total	Proportion
Meters	Number			Percent	Number			Percent
0-100	35	115	150	69.7	17	34	51	77.2
101-200	21	44	65	30.2	7	8	15	22.7
201-300*	NA	NA	NA	NA	NA	NA	NA	NA

NA - Not available
* Only one swordfish was taken deeper than 200 meters.
Source: Guitart-Manday, Dario. "Biologia pesquera del emperador o pez espada, (*Xiphias gladius* Linnaeus (Teleostomi: Xiphiidae) en aguas de Cuba," *Poeyana*, 1964, Serie B, No. 1, p. 19.

Appendix B4b1.--Cuba. Vertical distribution of billfish* taken in the artisanal longline fishery, May-September 1974

Species	Depth in meters					
	<10	10-40	40-80	120-180	180-240	>240
	Numbers of individuals					
Marlin						
White	3	8	7	5	4	3
Blue	3	4	7	25	19	14
Sailfish	7	7	4	-	1	-

* Marlins and sailfish
Source: Darío J. Guitart, Mar Juárez, and José D. Milera, "Análisis de las pesquerías deportivas de Agujas (Pisces; géneros *Istiophorus, Tetrapturus, Makaira*) en la región noroccidental de Cuba," *Ciencias Biológicas*, June 1981, p. 138.

Appendix B4b2.--Cuba. Vertical distribution of billfish* taken in the artisanal longline fishery, May-September 1974

Species	Depth in meters					
	<10	10-40	40-80	120-180	180-240	>240
	Percent					
Marlin						
White	10	26	23	17	13	10
Blue	4	5	10	35	26	19
Sailfish	37	37	21	-	5	-

* Marlins and sailfish

Source: Darío J. Guitart, Mar Juárez, and José D. Milera, "Análisis de las pesquerías deportivas de Agujas (Pisces; géneros *Istiophorus, Tetrapturus, Makaira*) en la región noroccidental de Cuba," *Ciencias Biológicas*, June 1981, p. 138.

Appendix B5.--Cuba. Swordfish stomach contents, February-March 1961

Prey item	Month		Total	Proportion
	Feb	Mar		
	Number			Percent
Crustaceans				
Shrimp	5	1	6	14.0
Unidentified	1	-	1	2.3
Mollusks				
Squid	7	5	12	27.9
Octopus	-	1	1	2.3
Finfish				
Pomfrets	13	3	16	37.2
Red hind	-	1	-	2.3
Unidentified	4	2	6	14.0
Total	39	13	43	100.0

Source: Dario Guitart-Manday, "Biologia pesquera del emperador o pez espada, (*Xiphias gladius* Linnaeus (Teleostomi: Xiphiidae) en aguas de Cuba," *Poeyana*, 1964, Serie B, No. 1, p. 6.

Appendix B6.--Cuba. Swordfish ovaries

Capture date	Weight		Proportion
	Whole fish	Ovaries	
	Kilograms		Percent
1941			
August 19	136.1	11.3	8.3
1942			
September 9	NA	NA*	NA
1962			
May	75.3	2.3	3.1
May	137.0	23.6	17.2
August	134.7	10.4	7.7
1963			
February	101.6	4.1	4.0
September	96.2	5.9	6.1
October	87.1	1.8	2.1
November	100.7	7.7	7.6

NA - Not available
* The ovaries measured 2 feet long and 5 inches at the greatest diameter. The eggs were reportedly ready to rupture the membrane.
Sources: F. LaMonte, "Note on breeding grounds of blue marlin and swordfish off Cuba," *Copeia*, No. 4, December 26, 1944, p. 258 and Dario Guitart-Manday, "Biologia pesquera del emperador o pez espada, (*Xiphias gladius* Linnaeus (Teleostomi: Xiphiidae) en aguas de Cuba," *Poeyana*, 1964, Serie B, No. 1, p. 24.

Appendix C1a1.--Cuba. Fisheries catch, 1955-98

Year	Catch	Year	Catch
	Metric tons		Metric tons
1955	12,800	1980	186,436
1956	15,600	1981	164,766
1957	22,000	1982	194,615
1958	21,900	1983	198,331
1959	28,200	1984	199,572
1960	31,200	1985	219,831
1961	30,500	1986	244,442
1962	35,000	1987	214,715
1963	35,600	1988*	214,868
1964	36,300	1989	172,364
1965	40,400	1990	164,116
1966	44,300	1991	148,622
1967	65,700	1992	86,526
1968	66,000	1993	74,491
1969	79,700	1994	67,391
1970	105,700	1995	71,860
1971	126,000	1996	75,777
1972	139,600	1997	77,334
1973	149.900	1998	62,154
1974	164,979	1999	NA***
1975	143,325		
1976	194,090		
1977	185,182		
1978	213,170		
1979	153,799		

* Entries beginning in 1988 do not include aquaculture. See appendix C1a2a.
** The Cuban press reports and MIP releases indicate a 1999 catch of 145,000-165,000 tons according to various reports. This has not yet confirmed by FAO. The Cuban estimates presumably include cultured harvests. NMFS notes that, even when cultured harvests are subtracted, this would be a very large catch increase. The authors know of no development in the fishing industry which would allow the Cubans to achieve such large catch increases. There are apparently differences between Cuban and FAO data systems. Differing treatment of mollusk shells is one possibility.
*** The FAO 1999 *Yearbook* arrived just as we were finalizing the Caribbean swordfish book for the printer. We have inserted a few of the 1999 numbers, but were not able to update most of the appendices and graphics, in part because Cuba revised fleet data for the entire decade of the 1990s. The 1999 catch was reported as 67,262. See appendix C1a2b2
Source: FAO, *Yearbook of Fishery Statistics*, (FAO: Rome, various years).

Appendix C1a2a.--Cuba. Fisheries catch by FAO statistical area, 1970-1989

Area	Year							
	1970	1975	1980	1985	1986	1987	1988	1989
	1,000 Metric tons							
Inland (02)	0.5	1.7	6.3	16.9	17.6	17.3	0.3*	0.3
Aquaculture	NA	NA	NA	NA	NA	NA	19.7*	24.1
Coastal (31)	61.8	59.0	68.4	79.7	78.4	80.8	77.1	75.5
Distant Water								
21	-	7.5	9.3	23.5	24.6	28.1	16.9	24.1
34	22.1#	7.0	9.3	12.7	5.5	3.3	3.9	3.0
41##	-	-	-	4.6	4.0	7.2	5.0	2.2
47##	21.4	45.0	5.0	35.6	25.0	37.5	24.6	29.4
87	-	24.0	89.0	46.9	89.4	40.4	87.0	37.8
Subtotal	43.5	83.5	112.6	123.3	148.5	116.5	137.4	96.5
Capture fisheries	105.8	143.3	186.5	219.8	244.4	214.7	214.9	172.4
Aquaculture	NA	NA	NA	NA	NA	NA	19.7	24.1
Grand total	NA	NA	NA	NA	NA	NA	234.6	196.5

FAO Areas
- 02 - Cuba inland
- 21 - Northwest Atlantic (Canada)
- 31 - Western-central Atlantic (Cuban coastal)
- 34 - Eastern-central Atlantic (West Africa). While not a precise measure, the catch in this FAO area in most years is a good rough approximation of FAC results.
- 41 - Southeastern Atlantic (Argentina)
- 47 - Southwestern Atlantic (southern Africa)
- 87 - Southeastern Pacific (Chile and Peru)

* FAO recomputed the inland catch which until 1987 had included cultured harvests. The authors only have the recomputed statistics beginning in 1988. The decline shown in this appendix reflects the recomputed data and not any significant decline in the actual inland catch. The cultured harvests that was once classified as inland was beginning in 1988 indicated in a separate category.
** Totals may disagree due to rounding.
# Cuban catches in 1970 and 1977 included an unusually high catch of jacks. See appendix C7a.
FAO has reported the catch of the Flota Cubana de Pesca in FAO areas 31 and 34. ICCAT reports, however that substantial quantities was taken in the northern area of areas 41 and 47.
Source: FAO, *Yearbook of Fishery Statistics*, various years.

Appendix C1a2b1.--Cuba. Fisheries catch by FAO statistical area, 1990-1998

Area	Year									
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
	1,000 Metric tons									
Inland (02)	0.2	0.2	0.3	0.9	0.4	0.7	0.9	1.2	1.0	NA
Aquaculture	24.1	22.5	22.5	18.2	20.3	22.3	33.9	46.2	38.0	80.5
Coastal (31)	59.5	58.3	54.3	41.5	51.6	50.0	48.8	58.9	53.4	NA
Distant Water										
21	27.6	32.0	26.0	30.0	12.3	18.3	24.0	17.3	7.7	NA
34	3.0	2.1	2.7	3.1	3.0	2.9	2.1	-	-	NA
41##	1.6	-	-	-	-	-	-	-	-	NA
47##	11.8	-	-	-	-	-	-	-	-	NA
87	60.4	56.1	3.2	Negl	-	-	-	-	-	-
Subtotal	104.4	90.2	31.9	33.1	15.3	21.1	26.1	17.2	7.7	NA
Capture fisheries	164.1	148.6	86.5	75.5	67.4	71.9	75.8	77.3	62.2	NA
Aquaculture	24.1	22.5	22.5	18.2	20.3	22.3	33.9	46.2	38.0	80.5
Grand total*	188.1	171.1	109.0	95.7	87.7	94.2	109.7	123.5	100.2	NA

* Totals may disagree due to rounding.
FAO has reported the catch of the Flota Cubana de Pesca in FAO areas 31 and 34. ICCAT reports, however that substantial quantities was taken in the northern area of areas 41 and 47. See appendix C8d2b.
Source: FAO, *Yearbook of Fishery Statistics*, various years (1990-98 data). MIP data (1999). Cuba significantly revised this data in the 1999 FAO *Yearbook*. See appendix C1a2b2. Due to time constraints, the authors were unable to modify the graphics in the report to reflect the Cuban revisions.

Appendix C1a2b2.--Cuba. Revised fisheries catch by FAO statistical area, 1990-1999

Area	Year									
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
	1,000 Metric tons									
Inland (02)	15.1	13.4	13.8	10.2	9.8	8.9	10.3	8.5	6.0	4.6
Aquaculture	9.1	9.3	11.0	12.8	16.3	21.9	36.3	44.1	46.7	55.2
Coastal (31)	59.3	58.1	54.3	41.5	51.6	50.0	48.8	58.9	53.4	51.5
Distant Water										
21	27.6	32.0	26.0	29.9	12.3	18.3	24.0	17.3	7.7	4.4
34	3.0	2.1	2.8	3.1	3.0	2.9	2.4	0.3	-	-
41##	1.6	-	-	-	-	-	-	-	-	-
47##	11.8	-	-	-	-	-	-	-	-	2.4
87	60.4	56.1	3.2	Negl	-	-	-	-	-	4.2
Subtotal	104.4	90.2	32.0	33.0	15.3	21.1	26.4	17.6	7.7	11.0
Capture fisheries	178.8	161.7	100.1	84.7	76.8	80.1	85.5	85.0	67.1	67.3
Aquaculture	9.1	9.3	11.0	12.8	16.3	21.9	36.3	44.1	46.7	55.2
Grand total*	187.9	171.0	111.1	97.5	93.1	102.0	121.8	129.1	113.8	122.5

* Totals may disagree due to rounding.
FAO has reported the catch of the Flota Cubana de Pesca in FAO areas 31 and 34. ICCAT reports, however
that substantial quantities was taken in the northern area of areas 41 and 47. See appendix C8d2b.
Source: FAO, *Yearbook of Fishery Statistics*, 1999). Cuba significantly revised this data in the 1999 FAO *Yearbook*. See previously published data C1a2b1. Due to time constraints, the authors were unable to modify the graphics in the report to reflect the Cuban revisions.

Appendix C1b.--Cuba. Current fishery statistics, 1995-99

Area	Growth rate*
	Percent
Total catch**	9.4
Cultured finfish harvest***	30.0
Domestic distribution	5.3
Total income	8.3
Exports	6.9
Fuel utilization#	-15.5

* Average annual growth rate between 1995-99.
** Industrial utilization levels of lobster reached 65 percent and 84 percent respectively.
*** The aquaculture harvest set a record in 1999 of 80,500 t of finfish.
# Fuel utilization per ton of catch was reduced to 0.467 t per t of catch. NMFS is, however, unsure what vessels are being compared or if the large aquaculture harvest is being treated as catch for the purpose of this estimate.
Source: MIP data as cited in Chuck Adams, Placido Sanchez Vega, and Anicia García Alvarez, "An overview of the Cuban commercial fishing industry and recent changes in management structure and objectives," *EDIS Document*, No. FE-218 (Institute of Food and Agricultural Sciences: Gainesville, Florida, 2000), p. 12.

Appendix C2a1.--Cuba. Tuna and tuna-like catch, 1980-89

Species	Year									
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
	1,000 Metric tons									
Billfish										
Marlin										
Blue	0.3	0.3	0.4	0.4	0.4	0.5	0.2	0.2	0.3	0.2
White	0.3	0.3	0.3	0.8	0.4	0.5	0.4	0.1	Negl	Negl
Sailfish	0.2	0.2	0.3	0.2	0.3	0.1	0.1	0.2	0.1	0.1
Total#	0.8	0.8	1.0	1.4	1.1	1.1	0.7	0.5	0.4	0.3
Mackerel										
Spotted Spanish	0.6	0.7	0.5	0.7	0.5	0.4	0.6	1.6	0.8	0.7
Swordfish	0.6	0.4	0.7	1.2	1.4	1.5	0.7	1.1	1.0	0.9
Tunas										
Albacore	0.1	0.1	0.1	0.1	0.1	Negl	0.1	Negl	Negl	Negl
Bigeye	1.4	0.7	0.5	0.4	0.4	0.2	0.2	0.2	0.2	0.1
Blackfin*	-	0.7	0.6	0.6	0.5	0.2	0.5	0.6	0.3	0.3
Black skipjack	0.1	0.1	0.1	Negl	Negl	Negl	Negl	0.1	0.1	0.1
Bluefin	-	-	-	-	-	-	-	-	-	-
Skipjack*	2.5	1.3	1.3	1.8	1.6	1.9	1.8	1.2	1.8	0.8
Yellowfin**	5.8	4.9	3.8	2.7	4.0	3.5	3.4	2.4	1.8	1.8
Total#	9.9	7.8	6.4	5.6	6.6	5.8	6.0	4.5	4.2	3.1
Other	Negl	-	-	-	-	-	-	-	-	-
Total#	11.9	9.7	8.6	8.9	9.6	8.8	8.0	7.7	6.4	5.0

NA - Not available
Negl - Magnitude of catch more than zero but less than 500 metric tons
No catch reported(-).
* Taken primarily by a fleet of about 60 small baitboats operating in Cuban coastal waters.
** An important part of the catch taken by a medium-sized purse seiner deployed extensively in the Gulf of Guinea off Africa.
# Totals may not agree due to rounding.
Note: The tuna and tuna-like catch is primarily taken by Cuban longliners. Baitboats, a purse seiner, and about 60 small vessels using trolls and modified surface longlines in coastal Cuban waters also participate in the fishery. Cuba has also deployed one purse seiner.
Source: ICCAT, *Statistical Bulletin*, various years.

Appendix C2a2a.--Cuba. Tuna and tuna-like catch, 1990-97

Species	Year							
	1990	1991	1992	1993	1994	1995	1996	1997
	1,000 Metric tons							
Billfish								
Marlin								
Blue	0.2	0.2	0.2	0.1	Negl	0.1	Negl	NA
White	Negl	Negl	Negl	-	-	-	-	NA
Sailfish	0.2	0.3	0.3	0.1	0.1	0.1	0.6	NA
Total#	0.4	0.5	0.5	0.2	0.1	0.2	0.6	NA
Mackerel								
Spotted Spanish	0.7	0.5	0.6	0.3	0.4	0.5	0.6	0.6
Swordfish	0.5	0.2	0.3	0.2	0.5	0.9	0.1	0.1
Tunas								
Albacore	Negl	Negl	Negl	Negl	-	-	-	-
Bigeye	0.1	Negl	1.0	Negl	Negl	Negl	Negl	NA
Blackfin*	0.5	0.3	0.2	0.1	0.2	0.2	0.3	0.3
Black skipjack	0.1	0.1	Negl	Negl	Negl	Negl	Negl	Negl
Bluefin	-	-	-	-	-	-	-	-
Skipjack*	1.5	1.6	1.6	1.0	1.3	0.9	1.0	1.0
Yellowfin**	0.9	0.7	0.7	0.5	0.3	0.3	0.3	0.3
Total#	3.1	2.7	3.5	1.6	1.8	1.4	1.6	1.6
Other	0.1	-	-	Negl	Negl	Negl	Negl	-
Total#	4.8	3.9	4.9	2.3	2.8	3.0	2.9	2.3

NA - Not available
Negl - Magnitude of catch more than zero but 500 metric tons (Negl).

No catch reported (-).
* Taken primarily by a fleet of about 60 small baitboats operating in Cuban coastal waters.
** An important part of the catch taken by a medium-sized purse seiner deployed extensively in the Gulf of Guinea off Africa.
# Totals may not agree due to rounding.
Note: The more valuable tuna catch (bigeye and yellowfin) is primarily taken by Cuban longliners. Baitboats and about 60 small vessels using trolls and modified surface longlines in coastal Cuban waters also participate in the fishery taking skipjack, black skipjack, and blackfin tuna. Cuba has also deployed one purse seiner which mostly took yellowfin and skipjack.
Note: The tuna and tuna-like catch is primarily taken by Cuban longliners. Baitboats, a purse seiner, and using trolls and modified surface longlines in coastal Cuban waters also participate in the fishery. Cuba has also deployed one purse seiner.
Source: ICCAT, *Statistical Bulletin*, various years.

Appendix C2a2b.--Cuba. Tuna and tuna-like catch, 1990-98

Species	Year								
	1990	1991	1992	1993	1994	1995	1996	1997	1998
	Metric tons								
Billfish									
Marlin									
Blue	124	139	154	69	39	85	43	53	12
White	Negl	Negl	Negl	-	-	-	-	-	-
Sailfish	286	267	270	119	129	109	570	41	28
Total***	410	406	424	188	168	194	613	94	40
Mackerels	665	538	611	666	44	61	78	160	7
Swordfish	495	232	273	208	502	864	67	9	10
Tunas									
Albacore	4	17	5	Negl	-	Negl	-	-	-
Bigeye	62	34	56	23	7	7	5	-	-
Blackfin*	487	318	196	54	223	156	287	301	226
Black skipjack	88	63	33	13	15	27	23	17	9
Bluefin	-	-	-	-	-	-	NLS	NLS	NLS
Skipjack*	1,566	1,649	1,638	1,024	1,268	886	1,000	1,282	1,302
Yellowfin**	851	676	664	542	252	266	297	6	14
Total***	3,058	2,757	2,592	1,656	1,765	1,342	1,612	1,606	1,551
Sharks and rays									
Sharks	3,129	2,014	2,796	2,796	3,391	3,056	2,460#	1,932	1,737
Rays	Negl	3	Negl	22	Negl	5	955#	1,359	1,336
Total***	3,129	2,017	2,796	2,818	3,391	3,061	3,415	3,291	3,073
Total***	7,757	5,950	6,696	5,536	5,992	5,522	5,785	5,160	4,681

NLS - Not listed separately, probably negligible.
Negl - Magnitude of catch more than zero but less than 0.5 metric tons
No catch reported (-).
* Taken primarily by a fleet of about 60 small baitboats operating in Cuban coastal waters.
** An important part of the catch taken by a medium-sized purse seiner deployed extensively in the Gulf of Guinea off Africa.
*** Totals may not agree due to rounding.
# The recomputation of this data may represent changes in the statistical system rather than any actual change in the fishery, but as they occurred in 1996 the probably represent shifts in the species composition as the Flota Atunera de Cuba withdrew from the eastern central Atlantic and a few longliners were deployed in the shark fishery around Cuba.
Note: The more valuable tuna catch (bigeye and yellowfin) is primarily taken by Cuban longliners. Baitboats and about small vessels using trolls and modified surface longlines in coastal Cuban waters also participate in the fishery taking skipjack, black skipjack, and blackfin tuna. Cuba has also deployed one purse seiner which mostly took yellowfin and skipjack.
Source: FAO, *Yearbook of Fishery Statistics*, various years.

Appendix C2b.--Cuba. Tuna and tuna-like catch by gear, 1970-97

Gear	Proportion							
	1970	1975	1980	1985	1990	1995	1996	1997
	Percent							
Longline	NA##	70.6	67.4	72.9	40.1	NA***	NA	NA
Baitboat	NA	22.5	19.5	20.4	43.2	36.2	44.8	57.0****
Purse seine	NA	4.2	7.9	6.8	4.4	Negl	Negl	-
Gillnet	NA	NA	NA	3.8	NA	NA	NA	NA
Troll*	NA	NA	3.4	0.5	11.7	18.6	21.0	26.7
Unclassified	NA	NA	NA	NA	0.6	45.0**	34.1**	15.9
Total#	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

NA - Not available
* Mostly Spanish mackerel. The increase in trolling during the 1990s comes not from greatly expanded effort, but rather because of the declining overall catch of tuna and tuna-like species.
** A substantial, but unknown portion of this catch would be longlining.
*** Cuba stopped reporting its longline catch as a separate category in 1993, but even in 1991 most of the longline catch was included in the unclassified category.
**** ICCAT has simply repeated the 1996 baitboat catch.
# Totals may not agree due to rounding
Cuba submitted a small entry for longlining, but most of the longline catch was entered in the unclassified category.
Source: García Moreno, "National report of Cuba," *ICCAT Report*, Part I, 1986-87 (ICCAT: Madrid, Spain, 1987), p. 270 (1985 data) and ICCAT, *Statistical Bulletin*, various years (1970-97 data).

Appendix C3.--Cuba. Flota Atunera de Cuba (FAC) catch, 1991-94

Year	Catch
	Metric tons
1991	1,700
1992	2,100
1993	2,600
1994	2,400

Source: Ministerio de Pesca, anonymous source, May 21, 1995.

Appendix C4a1.--Cuba. Artisanal fishery species composition, April-October 1962

Month	Effort	Species					
		Swordfish		Billfish**		Sharks	
		Individuals	Quantity	Individuals	Quantity	Individuals	Quantity
	Days*	Number	Kilograms	Number	Kilograms	Number	Kilograms
April	8	5	396	2	186	4	82
May	14	14	992	17	517	15	291
June	18	-	-	28	922	16	499
July	8	-	-	17	564	4	110
August	12	9	458	4	256	5	168
September	20	6	280	19	1,079	2	18
October	18	13	520	13	669	11	754
Total***	98	47	2,647	100	4,185	57	1,922

* Days fishing
** Marlins and sailfish
*** Totals may not agree due to rounding
Source: Dario Guitart-Manday, "Biologia pesquera del emperador o pez espada, (*Xiphias gladius* Linnaeus (Teleostomi: Xiphiidae) en aguas de Cuba," *Poeyana*, 1964, Serie B, No. 1, p. 31.

Appendix C4a1a2.--Cuba. Artisanal fishery species composition, April-October 1962

Month	Species		
	Swordfish	Billfish	Sharks
		Percent*	
April	60	28	12
May	55	29	16
June	-	65	35
July	-	84	16
August	52	29	19
September	20	79	1
October	27	34	39
Total	30	48	22

* Of quantity in appendix C4a1a1. Entries may not add to 100 due to rounding.
Note: Swordfish catches off Cuba would theoretically peak from December to March. As data on these months are not available, the total here would not appear to be a good reflection of representative annual species composition in the fishery.
Source: Dario Guitart-Manday, "Biologia pesquera del emperador o pez espada, (*Xiphias gladius* Linnaeus (Teleostomi: Xiphiidae) en aguas de Cuba," *Poeyana*, 1964, Serie B, No. 1, p. 31.

Appendix C4a1a3.--Cuba. Artisanal fishery average sizes, April-October 1962

Month	Species		
	Swordfish	Billfish	Sharks
		Kilograms*	
April	79.2	93.0	20.5
May	70.9	58.4	19.4
June	-	32.9	31.2
July	-	33.2	27.4
August	50.9	64.0	33.6
September	46.7	56.8	9.1
October	40.0	51.5	68.6
Total	56.3	41.8	33.7

* Based on data in appendix C4a1a1.
Note: Swordfish off Cuba would theoretically average larger sizes from December to March as the larger females return south from the annual migration north.
Source: Dario Guitart-Manday, "Biologia pesquera del emperador o pez espada, (*Xiphias gladius* Linnaeus (Teleostomi: Xiphiidae) en aguas de Cuba," *Poeyana*, 1964, Serie B, No. 1, p. 31.

Appendix C4a1b.--Cuba. Artisanal fishery species composition, 1971-73

Species	Proportion
	Percent
Sharks*	41.1
Billfish	32.9
Swordfish	25.9

Note: Another Cuban author reports that in the artisanal fishery from 1960-84, that swordfish catches were normally 70 percent grater than billfish catches. A. Olaechea, "Ordenamiento de las pesquerías de peces de pico con palangre de superficie en aguas oceánicas alrededor de Cuba," Tesis para la aspirantura Dr. en Ciencias, (CIP: Havana, 1985) as cited in Espinoza, Sosa, Moreno, and Quevedo, "Aspectos biologicos ...," *op. cit.*, p. 267.
* Species distribution available in appendix C11d.
Source: Dario Guitart Manday, "La pesquerias pelagico-oceanicas de corto radio de accion en la region noroccidental de Cuba," *Serie Oceanologica*, No. 31, 1975, p.4.

Appendix C4a2a.--Cuba. Artisanal longline fishery* species composition, May 1984-April 1985

Establishment	Billfish			Total
	Swordfish	Marlin	Other**	
		Metric tons		
Boca de Jaruco	29.8	6.6	2.1	38.5
Cojímar	16.8	11.1	1.3	29.2
Total	46.6	17.7	3.3	67.6

Note: Only the swordfish and billfish catch is computed here. Although the authors do not mention it, there was probably a significant shark bycatch.
* Swordfish and other billfish catch of two "establishments" operating artisanal longliners.
** Primarily white marlin and sailfish.
Establishments:
Boca Jaruco: Had the larger fleet and focused more on taking swordfish in night sets.
Cojímar: Had a smaller fleet, but pursued more day-time sets, explaining the larger marlin catch.
Source: L. Espinosa, M. Sosa, S. Moreno, and R. Quevedo, "Aspectos biologicos de los peces de pico en la region noroccidental de Cuba," *ICCAT Collective Volume of Scientific Papers*, Vol. 28 SCRS/87/22 (Madrid: ICCAT, 1988), pp. 275.

Appendix C4a2b.--Cuba. Artisanal longline fishery* species composition, May 1984-April 1985

Establishment	Billfish			Total
	Swordfish	Marlin	Other**	
		Percent		
Boca de Jaruco	77.6	17.0	5.4	100.0
Cojímar	57.6	38.1	4.3	100.0
Average	69.0	26.1	4.9	100.0

Note: Only the swordfish and billfish catch is computed here. Although the authors do not mention it, there was probably a significant shark bycatch.
* Swordfish and other billfish catch of two "establishments" operating artisanal longliners.
** Primarily white marlin and sailfish.
Source: L. Espinosa, M. Sosa, S. Moreno, and R. Quevedo, "Aspectos biologicos de los peces de pico en la region noroccidental de Cuba," *ICCAT Collective Volume of Scientific Papers*, Vol. 28 SCRS/87/22 (Madrid: ICCAT, 1988), pp. 275.

Appendix C4a3a.--Cuba. Species composition in FAO longline work off Cuba, 1966-70

Species		Proportion of catch
English	Spanish	
		Percent
Sharks	Escualos	26.0
Bluefin tuna*	Atún aleta azul	19.4
Coastal billfish**	Aguja de costa	14.3
Swordfish	Pez espada	13.9
Marlin	Marlín	13.5
Yellowfin tuna	Atún de aleta amarilla	4.7
Albacore***	Albacora	2.4
Skipjack	Patudo	1.7
Other billfish	Aguja	1.2
Other		2.9

Note: As this is a FAO report, the generic Spanish species names are used rather than the Cuban terms used in appendix C4b1.
* This seems like an extremely large proportion of bluefin and a very small proportion of yellowfin, but it is as reported in the source.
** Unclear as to what species of billfish, presumably sailfish and white marlin.
*** Cuban sources sometimes refer to blackfin or other small tunas as albacora, but the entry here is probably *T. alalunga*.
Source: FAO, "Mejora e incremento de la pesca de atun con palangre: Informe al gobierno de Cuba," *Informes*, No. 2987 (FAO: Rome, 1971), p. 9.

Appendix C4a3b.--Cuba. Species composition in FAO longline test fishing off Cuba, 1966-70

Species English	Species Spanish	Proportion of catch
Billfish		Percent
Coastal billfish**	Aguja de costa	14.3
Marlin	Marlín	13.5
Other billfish	Aguja	1.2
Billfish total		29.0
Sharks	Escualos	26.0
Tunas		
Bluefin tuna *	Atún aleta azul	19.4
Yellowfin tuna	Atún de aleta amarilla	4.7
Albacore***	Albacora	2.4
Skipjack	Patudo	1.7
Tuna total		28.2
Swordfish	Pez espada	13.9
Other		2.9

Note: As this is a FAO report, the generic Spanish species names are used rather than the Cuban terms used in appendix C4b1.
* This seems like an extremely large proportion of bluefin and a very small proportion of yellowfin, but it is as reported in the source.
** Unclear as to what species of billfish, presumably sailfish and white marlin.
*** Cuban sources sometimes refer to blackfin or other small tunas as albacora, but the entry here is probably *T. alalunga*.
Source: FAO, "Mejora e incremento de la pesca de atun con palangre: Informe al gobierno de Cuba," *Informes*, No. 2987 (FAO: Rome, 1971), p. 9.

Appendix--C4a4.--Cuba. Species composition in artisanal longline fishery off northwestern Cuba, 1981-87

Year	Species				
	Swordfish	Billfish*	Shark**	Tuna	Other
			Percent		
1981	18.1	8.2	68.5	1.1	3.5
1982	20.0	3.2	68.8	1.5	6.3
1983	20.0	3.9	69.7	2.3	3.8
1984	19.3	4.1	67.6	4.4	4.3
1985	17.3	3.9	73.9	2.3	2.2
1986	21.7	2.5	68.0	4.2	2.4
1987	20.7	3.2	69.3	4.2	2.4
Total	19.7	4.0	69.5	2.9	3.7

* "Castero" in some cases refers to blue marlin, in other instances to billfish in general. Here it refers to billfish in general.
** Including silky, oceanic whitetip, bignose, bull, dusky, blue, hammerheads, night, thresher, tiger, and longfin and shortfin makos.
Source: Jorge Pol, Luis Muñoz, Sonia Moreno, and Andrés Rodríguez, "Evolución de la abundancia de grandes pelágicos en la región noroccidental de Cuba," *Revista de Investigaciones Marinas*, Vol. XI, No. 1, 1990, p. 45.

Appendix--C4a5.--Cuba. Derived correlation coefficients showing relationships between species in the catch data from the artisanal longline fishery off northwestern Cuba, 1981-87

Year			Species				
	Effort	Total	Swordfish	Billfish	Shark	Tuna	Other
Effort	1.000						
Total	-0.087	1.000					
Swordfish	-0.360	0.613*	1.000				
Blue marlin	-0.074	0.117	0.170	1.000			
Shark	-0.016	0.918*	0.319*	-0.085	1.000		
Tuna	-0.010	0.048	0.369*	0.763*	-0.207	1.000	
Other	0.090	0.042	-0.197	-0.175	0.045	-0.268	1.000

* Significant
Source: Jorge Pol, Luis Muñoz, Sonia Moreno, and Andrés Rodríguez, "Evolución de la abundancia de grandes pelágicos en la región noroccidental de Cuba," *Revista de Investigaciones Marinas*, Vol. XI, No. 1, 1990, p. 45.

Appendix C4b1.--Cuba. Species composition of commercial longline fleet, 1982-86

Species		Proportion of Catch*	
English	Spanish	Atlantic	Cuban EEZ
		Percent	
Billfish	Aguja		
Billfish**	Aguja	9	9
Blue marlin	Castero	4	11
Total billfish		13	20
Sharks	Escualos	19	11
Tunas	Atún		
Yellowfin tuna	Aleta amarilla	46	64
Albacore***	Albacora	1	2
Bigeye	Ojo grande	8	Negl
Total tuna		55	66
Swordfish	Emperador	12	2
Other		2	1
Total		101#	100

* Probably individual fish.
** Unclear as to what species of billfish, presumably sailfish and white marlin.
*** Cuban sources sometimes refer to blackfin or other small tunas as albacora, but the entry here is probably *T. alalunga*, especially in articles dealing in the tuna fishery off Cuba.
# Presumably this does not add to 100 because of rounding the original data.
Source: A. Rodríguez, S. Nieto, and P.O. Castro, "Aspectos comparativos de la pesqueria cubana se tunidos y afines en el Atlántico centrorinental y centroccidental," *ICCAT Collective Volume of Scientific Papers* (SCRS/90/60), Vol. 35 (ICCAT: Madrid, 1991), p. 175.

Appendix C4b2.--Cuba. Species composition of commercial longline fleet, 1973-85

Species		Proportion*
English	Spanish	
		Percent
Billfish	Aguja	
Billfish**	Aguja	14
Blue marlin	Castero	2
Total billfish		16
Sharks#	Escualos	13
Tunas	Atún	
Yellowfin tuna	Aleta amarilla	45
Albacore***	Albacora	2
Bigeye	Ojo grande	16
Total tuna		63
Swordfish	Emperador	5
Other***		3
Total		100

* In terms of individual fish.
** Unclear as to what species of billfish, presumably sailfish and white marlin.
*** The source dies not mention an "other" category, but as the catch components only add to 97 percent, we assume the missing 3 percent is other species.
# Primarily night, thresher, tiger, and long and short-finned makos.
Source: Rodríguez Rodríguez, A., S.F. Nieto Misas, L. Muñoz Unibarre. "Análisis de la abundancia (1973-1985) de grandes pelagicos en la zona oceanica del Atlántico tropical oriental," *ICCAT Collected Volume of Scientific Papers*, (SCRS/87/24), vol. 28 (ICCAT: Madrid: 1988), pp. 347.

Appendix C5a.--Cuba. Billfish catch composition in recreational fishing tournaments, 1978-79

Species	May										August			
	Hemingway Nac. '78		Hemingway Int. '78		Hemingway Nac. '79		Hemingway Int. '79		Primavera '79		Castero '78		Castero '79	
	Ind	Pro	Ind	Pro	Ind	Pro	Ind	Pro	Ind	Pro	Ind	Pro	Ind	Pro
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Marlin														
White	49	89.1	84	78.5	14	66.6	41	56.9	21	53.8	1	5.3	-	-
Blue	5	9.1	10	9.3	7	33.3	15	20.8	2	5.1	3	15.8	2	15.4
Sailfish	1	1.8	13	12.1	-	-	16	22.2	16	41.0	15	78.9	11	84.6

Ind - Number of individual fish
Pro - Proportion in percent
Source: Darío J. Guitart, Mar Juárez, and José D. Milera, "Análisis de las pesquerías deportivas de agujas (Pisces; géneros *Istiophorus, Tetrapturus, Makaira*) en la región noroccidental de Cuba," *Ciencias Biológicas*, June 1981, p. 128.

Appendix C5b. Cuba. Results of the 19th International Blue Marlin Tournament, September 11-16, 2000

Species	Releases
	Number
Marlin	
Blue	16
White	8
Sailfish	1
Total	25

Note: The above results are approximations as they were compiled from text rather than an actual statistical table.
Source: InTheBite.Com, "19th Annual blue Marlin International Tournament--Cuba, September 11-16, 2000," internet site accessed December 14, 2000: http://www.inthebite.com/cuba/bluemarlin.html

Appendix C6a.--Cuba. Large pelagic catch, 1987-97

Year	Species												Total
	YFT	ALB	BET	BLF	LTA	SKJ	BON	SSM*	BIL	SWO	OTH		
						Metric tons							
1980	5,817	58	1,385	0	131	2,451	0	578	829	594	39	NA	11,882
1981	4,942	101	711	721	53	1,284	0	657	804	374	0	NA	9,647
1982	3,754	111	521	622	77	1,323	0	476	1,025	686	0	NA	8,595
1983	2,709	74	421	558	6	1,835	0	689	1,464	1,228	0	NA	8,984
1984	4,005	136	447	487	15	1,558	0	544	1,051	1,367	0	NA	9,610
1985	3,491	47	239	157	16	1,878	0	443	1,112	1,463	0	NA	8,846
1986	2,443	55	171	486	24	1,846	0	621	736	731	0	NA	7,113
1987	2,357	25A	190A	634	55	1,182	23	1,606	518A	1,083A	-	NA	7,673
1988	1,792	6A	151A	332	53	1,837	173	803	422E	991A	-	NA	6,560
1989	794	1A	87A	318	113	1,780	26	746	302EX	917A	-	NA	5,084
1990	851	4A	62A	487	88	1,529	28	665	409AEF	495A	-	NA	4,618
1991	676F	17F	34A	318F	63F	1,596F	-	538F	466AEF	232A	-	NA	3,940
1992	664F	5A	56A	196F	33F	1,638F	-	611F	484AEF	273A	-	NA	3,960
1993	542F	3F	36F	54F	13F	1,024F	-	310F	188EF	208F	3F	NA	2,381
1994	252F	-	7F	223	15F	1,268F	-	409F	168F	502F	30F	NA	2,874
1995	266F	-	7F	156	27	886	-	548F	194F	864F	3F	NA	2,951
1996	297F	-	5F	287F	23F	1,000F	-	613F	613F	67F	21F	NA	2,926
1997	309G	-	-	287E	23E	1,000E	-	613E	NA	67G	-	NA	NA

A - Officially reported catch or landings which have been further subdivided or redistributed by fishery gear and/or area by the SCRS, an ICCAT working group, or the Secretariat.
E - SCRS or SCRS working group estimate. Includes estimates by national scientists or the Secretariat which have been reviewed and approved by the SCRS. In the case of 1967 they have basically repeated the data reported in 1966.
F - FAO, *Yearbook of Fishery Statistics.*
G - Secretariat estimate on the basis of best available data.
NA - Not available
X - More than one source of information.
* Most all of these species were taken by longliners, with the exception of Spanish mackerel spotted Spanish mackerel-SSM (gillnets and trolls in addition to longlines), skipjack--SKJ (mostly baitboats), black skipjack-LTA (baitboats); yellowfin tuna--YFT (some purse seine catch). Cuba since 1991 has submitted less information on the type of gear used. This table provides a rough indicator of the longline species distribution except for the fisheries listed above and the fact that sharks, which in some years are significant, are not included.

Species code:
- ALB - Albacore tuna (Thunnus alalunga)
- BET - Bluefin tuna (T. thynnus thynnus)
- BIL - Unclassified billfish (not including swordfish) (Istiophoridae)
- BLF - Blackfin tuna (T. atlanticus)
- BON - Atlantic bonito (Sarda sarda)
- LTA - Atlantic black skipjack (Euthynnus alletteratus)
- OTH - Other
- SHA - Sharks
- SKJ - Oceanic skipjack (Katsuwonus pelamis)
- SSM - Spanish spotted mackerel (Scomberomorus maculatus)
- SWO - Swordfish (Xiphias gladius)
- YFT - Yellowfin tuna (T. albacares)

Source: ICCAT, *Statistical Bulletin*, various years.

Appendix C6b.--Cuba. Longline catches, 1980-99

Year	Catch			
	Yellowfin	Swordfish	Billfish	Sharks*
	Metric tons			
1980	5,817	594	829	3,077
1981	4,942	374	804	5,357
1982	3,754	686	1,025	4,571
1983	2,709	1,228	1,464	5,309
1984	4,005	1,367	1,051	4,315
1985	3,491	1,463	1,112	4,784
1986	3,343	731	726	3,427
1987	2,357	1,083	518	3,621
1988	1,792	991	422	3,301
1989	794	917	384	3,759
1990	851	495	410	3,129
1991	676	232	406	2,017
1992	664	273	424	2,837
1993	542	208	188	2,847
1994	252	502	168	3,391
1995	266	864	194	3,061
1996	297	67	613	3,415
1997	6	9	94	3,291
1998	14	10	40	3,072
1999	34	5	229**	2,847

* Includes rays and skates (appendix C11b).
** Most of the increase was sailfish.
Source: FAO, *Yearbook of Fishery Statistics*, various years.

Appendix C7a.--Cuba. Fisheries catch in area 34, by species, 1970-98

Year	Species						Total	Proportion		
	Swordfish	Yellowfin	Other/Tuna	Billfish	Shark	Others		Tuna	Swordfish	Shark
				Metric tons				Percent		
1970	NA	1,600	4,700#	300	200	15,300##	22,100	NS	NA	NS
1971	NA	1,700	3,800#	200	100	3,200	9,000	61***	NA	1
1972	NA	3,500	2,600#	300	Negl	400	6,800	90***	NA	Negl
1973	NA	4,900	3,300#	800	200	1,400	10,600	77***	NA	2
1974	NA	3,800	2,800#	2,000	400	1,700	10,700	62***	NA	4
1975	300	2,100	2,200#	800	600	600	6,600	65	5	9
1976	200	3,400	1,700#	500	300	300	6,400	80	3	5
1977	300	3,900	2,000#	400	300	13,800##	20,700	NS	NS	NS
1978	200	3,000	2,600#	400	400	100	7,200	77	3	6
1979	300	3,400	2,600#	700	500	Negl	7,500	80	4	7
1980*	380	5,817	1,651#	706	573	131	9,258	81	4	6
1981	215	4,942	1,049	367	1,916	527	9,016	66	2	19
1982	579	3,689	835	527	1,244	Negl	6,874	65	8	18
1983	1,112	1,916	591	940	2,111	Negl	6,670	38	17	32
1984	1,228	3,470	886	455	1,315	10,331	17,685	NS	NS	NS
1985	1,315	3,179	532	635	1,893	5,488	13,042	NS	NS	NS
1986	588	2,903	790	392	758	62	5,493	67	11	14
1987	101**	2,132	296	201	580	39	3,349	72	3**	17
1988	889	1,694	363	226	773	1	3,946	52	22	20
1989	822	703	479	265	689	-	2,958	40	30	23
1990	428	798	177	319	1,244	25	2,991	33	14	42
1991	178	658	244	280	689	22	2,071	44	9	33
1992	248	653	72	294	1,482	8	2,757	31	9	54
1993	200	541	314	139	1,915	-	3,109	28	6	62
1994	492	238	154	110	2,008	-	3,002	13	16	67
1995	849	212	15	116	1,691	10	2,883	8	29	59
1996	62	257	26	575	1,051	435	2,406	12	3	44
1997	-	269###	-	-	-	-	269	100	-	-
1998	-	-	-	-	-	-	-	-	-	-
1999	-	-	-	-	-	-	-	-	-	-

NA - Not available/not applicable
NS - Not statistically significant because of the unusual catch of other species.
* Cuban catch reports until 1980 to primarily rough estimates. Apparently more accurate data was provided to FAO beginning in 1980.
** This actually was a good year for swordfish, but most of the catch was reported in the western Atlantic.
*** The actual amount would have been lower if swordfish data would have been available.
# The great bulk of the other tunas through 1980, sometimes exceeding 3,000 t, was reported as bigeye. Almost surely much of this was misclassified yellowfin. After 1980 the reported bigeye catch declined to only 711 t (1981) and 100-200 t after 1984.
This may reflect changes in the statistical reporting or shifts in effort and fishing strategy.
Includes large quantities of jacks.
Earlier editions of the FAO Yearbook reported no 1997 catch. A yellowfin catch without any other species suchb as other tunas, sharks, billfish, and swordfish seems unlikey.
Source: FAO, *Yearbook of Fishery Statistics*, various years.

Appendix C7b.--Cuba. Catch of tuna species targeted by the baitboat fleet in FAO area 31, 1990-99

Year	Species		
	Skipjack	B. skipjack	Blackfin
		Metric tons	
1990	1,443	63	487
1991	1,403	63	318
1992	1,627	33	196
1993	752	13	54
1994	1,151	15	223
1995	881	27	156
1996	1,000	23	287
1997	1,282	17	301
1998	1,302	9	226
1999	750	-	247

Source: FAO, *Yearbook of Fishery Statistics*, various years.

Appendix C8a.--Cuba. Swordfish catch, 1958-98

Year	ICCAT	FAO	Cuba
		Metric tons	
1958	-		
1959	300		
1960	300		
1961	300		
1962	400		
1963	188		
1964	235		
1965	335		
1966	297		
1967	895		
1968	634		
1969	267		
1970	282	100	
1971	234	200	
1972	141	-	
1973	469	-	
1974	1,081	-	
1975	528	900	-
1976	600	600	600
1977	700	700	700
1978	600	600	600
1979	400	400	400
1980	594	594	600
1981	374	374	400
1982	686	686	
1983	1,228	1,228	
1984	1,367	1,367	
1985	1,463	1,463	
1986	631	731	
1987	1,083	1,083	
1988	991	991	
1989	917	917	
1990	495	495	
1991	232	232	
1992*	273	273	
1993	208	208	
1994	NA	502	
1995	864	864	
1996	67	67	
1997	NA**	9	
1998	NA	10	
1999	NA	5	

Note: Statistical discrepancies before 1976 are unexplained.
* The 1992 was the last year Cuba submitted data to ICCAT.
** ICCAT has simply repeated the 1996 catch data.
Sources: Various ICCAT, FAO, and Cuban sources.

Appendix C8b.--Cuba. Swordfish longline catch by fishing area, 1958-96

Year	Atlantic area		Total
	North	South	
	Metric tons		
1958	-	NA	-
1959	300	-	300
1960	300	-	300
1961	300	-	300
1962	400	-	400
1963	125	63	188
1964	134	101	235
1965	171	164	335
1966	175	122	297
1967	336	559	895
1968	224	410	634
1969	97	170	267
1970	134	148	282
1971	160	74	234
1972	75	66	141
1973	248	221	469
1974	572	509	1,081
1975	280	248	528
1976	283	317	600
1977	398	302	700
1978	281	319	600
1979	128	272	400
1980	278	316	594
1981	227	147	374
1982	254	432	686
1983	410	818	1,228
1984	206	1,161	1,367
1985	162	1,301	1,463
1986	636	95	631
1987	910	173	1,083
1988	832	159	991
1989	87	830	917
1990	47	448	495
1991	23	209	232
1992*	27	246	273
1993**	50	192	208
1994	50	452	502
1995	86	778	864
1996	7	60	67
1997***	NA	NA	NA

Note: There are statistical discrepancies with appendix C8d1, but FAO and ICCAT are attempting to resolve those discrepancies. See footnote 711 in the text of the Cuban chapter.
* The 1992 data was the last year Cuba submitted data to ICCAT
** ICCAT used FAO data
***ICCAT has repeated the 1996 catch because no 1997 is yet available.
Sources: ICCAT, "Report of the Standing Committee on research and Statistics," *ICCAT Report*, Part I, 1990-91 (ICCAT: Madrid, Spain, 1991), pp. 233-234; ICCAT, "Report of the Standing Committee on Research and Statistics," *ICCAT Report*, Part II, 1992-93 (ICCAT: Madrid, Spain, 1994), pp. 259-260; and
ICCAT, *Statistical Bulletin*, various years.

Appendix C8c.--Cuba. Swordfish catch by fishing gear and area, 1974-97

Year	North Atlantic		South Atlantic		Total
	Longline	Other*	Longline	Other	
		Metric tons			
1974	572	-	509	-	1,081
1975	280	-	248	-	528
1976	283	-	317	-	600
1977	398	-	302	-	700
1978	281	-	319	-	1,300
1979	128	-	272	-	400
1980	134#	-	316	-	450
1981	182#	-	147	-	329
1982	260#	-	432	-	692
1983	272#	-	818	-	1,090
1984	164#	-	1,161	-	1,325
1985	152#	-	1,301	-	1,453
1986	157#	-	95	-	252
1987	52#	-	173	-	225
1988	23#	-	159	-	182
1989	17#	-	830	-	847
1990	47#	-	448	-	495
1991	-	23	-	209	232
1992	-	27	-	246	273
1993	-	16	-	192	208
1994	-	50	-	452	502
1995	-	86	-	778	864
1996	-	7	-	60	67
1997**	-	7	-	60	67

* Includes unclassified gear, probably mostly longline.
** ICCAT has repeated because the 1996 catch because no 1997 data was available.
# ICCAT has since published revised data (appendix C8b). The principal point of this appendix, however, is that the Cuban swordfish catch is taken with longlines.
Source: ICCAT, "Report of the Standing Committee on Research and Statistics," *ICCAT Report*, Part II, 1992-93 (ICCAT: Madrid, Spain, 1994), pp. 259-260 and subsequent releases at ICCAT meetings; and ICCAT, *Statistical Bulletin*, various years.

Appendix C8d1.--Cuba. Swordfish catch by fishing area, 1970-99

Year	FAO area*		Total
	31	34	
	Metric tons		
1970	100	-	100
1971	200	-	200
1972	-	-	-
1973	-	-	-
1974	-	-	-
1975	600	300	900
1976	400	200	600
1977	400	300	700
1978	400	200	600
1979	100	300	400
1980	214	380	594
1981	159	215	374
1982	107	579	686
1983	116	1,112	1,228
1984	139	1,228	1,367
1985	148	1,315	1,463
1986	143	588	731
1987	982	101	1,083
1988	102	889	991
1989	95	822	917
1990	67	428	495
1991	54	178	232
1992	25	248	273
1993	8	200	208
1994	10	492	502
1995	15	849	864
1996	5	62	67
1997	9	-	9
1998	10	-	10
1999	5	-	5

* FAO areas:
31 - Western central Atlantic
34 - Eastern central Atlantic

Source: FAO, *Yearbook of Fishery Statistics*, various years.

Appendix C8d2a.--Cuba. Swordfish catch by fishing area, 1970-97

Year	Atlantic# North	Atlantic# South##	Total
	Metric tons		
1958	ND	ND	ND
1959	300*	-	300
1960	300*	-	300
1961	300*	-	300
1962	400*	-	400
1963	125	-	125
1964	134	101	235
1965	171	164	335
1966	175	122	297
1967	336	559	895
1968	224	410	634
1969	97	170	267
1970	134	148	282
1971	160	74	200
1972	75	66	141
1973	248	221	269
1974	572	509	1,081
1975	280	248	528
1976	283	317	600**
1977	398	302	700**
1978	281	319	600**
1979	128	272	400**
1980	278	316	594
1981	227	147	374
1982	254	432	686
1983	410	818	1,228
1984	206	1,161	1,367
1985	162	1,301	1,463
1986	636	95	731
1987	910	173	1,083
1988	832	159	991
1989	87	830	917
1990	47	448	495
1991	23	209	232
1992	27	246	273
1993	16	192	208
1994	50	452	502
1995	86	778	864
1996	7	60	67
1997	NA	NA	NA
1998	NA	NA	NA

NA - Not available. ICCAT in TUNASTAT repeats the 1996 data.
ND - No data reported
While a substantial proportion of the Cuban swordfish catch has been taken in the south Atlantic, all of it has been taken in equatorial waters north of 10°S latitude.
Catch broken down by specific FAO area is detailed below in appendix C8d2b.
* Northwest Atlantic
** Statistical theory suggests that it is highly unlikely that Cuban catches would have come out in such even numbers 4 years in a row. This data appears to be rough estimates of actual catches. While actual catch data was not submitted by Cuba is unknown. The Cubans in the 1970s were conducing a sophisticated distant-water fishery so actual catch data must have been compiled.
Source: ICCAT, *TUNASTAT*, version 29v09, April 2000.

Appendix C8d2b1.--Cuba. Swordfish catch by FAO areas, 1990-99

Year	FAO areas				Totals
	31	34	41*	47*	
		Metric tons			
1990	67	428	-	-	495
1991	54	178	-	-	232
1992	25	248	-	-	273
1993	8	200	-	-	208
1994	10	492	-	-	502
1995	15	849	-	-	865
1996	5	62	-	-	67
1997	9	-	-	-	9
1998	10	-	-	-	10
1999	5	-	-	-	5

Note: FAO and ICCAT are attempting to work out statistical discrepancies.
Source: FAO. *Yearbook of Fishery Statistics*, 1998.

Appendix C8d2b2.--Cuba. Swordfish catch by FAO areas, 1990-97

Year	FAO areas				Totals
	31	34	41*	47*	
		Metric tons			
1990	13.7	232.5	170.1	78.6	494.9
1991	6.5	109.0	79.9	36.9	232.3
1992	7.5	128.3	93.9	43.5	273.2
1993	5.7	97.7	71.6	33.1	208.1
1994	13.2	236.3	172.8	79.9	502.2
1995	23.9	406.2	297.3	137.5	864.9
1996	1.9	31.5	23.0	10.6	67.0
1997	NA**	NA**	NA**	NA**	NA**

Note: FAO and ICCAT are attempting to work out statistical discrepancies.
* While these are south Atlantic fishing areas, Cuban fishing in these areas was north of 10°S latitude.
** 1996 data repeated for 1997 in source
Source: ICCAT website: http://www.iccat/es/Stats.html, retrieved July 3, 2000.

Appendix C8e.--Cuba. Swordfish as a proportion of the tuna and tuna-like catch, 1980-98

Year	Catch			Proportion	
	Swordfish	Yellowfin	Total*	Swordfish	Yellowfin
		Metric tons		Percent	
1980	594	5,817	11,800	5	49
1981	374	4,942	9,700	4	51
1982	686	3,754	8,595	8	44
1983	1,228	2,709	8,894	13	30
1984	1,367	4,005	9,610	15	42
1985	1,463	3,491	8,846	17	39
1986	631	2,443	7,113	9	34
1987	1,083	2,357	7,673	14	31
1988	991	1,792	6,560	15	27
1989	917	794	5,084	18	16
1990	495	851	4,618	11	18
1991	232	676	3,940	6	17
1992	273	664	3,960	7	17
1993	208	542	2,381	9	23
1994	502	252	2,874	17	9
1995	864	266	2,951	29	9
1996	67	297	2,926	2	10
1997	9	6	NA	NA	NA
1998	10	14	NA	NA	NA

* Appendix C6
Source: B. García Moreno, "National report of Cuba," *ICCAT Report*, Part I, 1986-87 (ICCAT: Madrid, Spain, 1987), p. 269 updated with ICCAT and FAO statistics.

Appendix C8f.--Wider Caribbean. Cuban swordfish catches by ICCAT 5° square* and quarter, 1959-97

ICCAT Square*	Year	Quarter 1	2	3	4	Total
		Metric tons				
0550	1959			0.3		0.3
	1960			0.3		0.3
	1961			0.3		0.3
	1962			0.4		0.3
	1963			0.2		0.2
	1964			0.2		0.2
	1965			0.3		0.3
	1966			0.3		0.3
	1967			0.9		0.9
	1968			0.6		0.6
	1969			0.3		0.3
	1970			0.3		0.3
	1971			0.2		0.2
	1972			0.1		0.1
	1973			0.5		0.5
	1974			1.1		1.1
	1975			0.5		0.5
	1976			0.6		0.6
	1977		0.9	0.9		1.8
	1978	0.8	0.3			1.1
	1980		0.2			0.2
	1981		1.3			1.3
	1982		0.7	0.1		0.8
	1983	0.2				0.2
	1984		3.3		1.7	5.0
	1985		1.3		4.7	6.0
	1986		0.8	0.2	0.9	1.9
	1987	0.2		0.2	12.4	12.6
	1988	0.8		0.7	0.8	2.3
	1989			0.1	0.1	0.2
	1990		0.2	1.7	2.2	4.1
	1991		0.1	0.8	1.0	1.0
	1992		0.1	0.9	1.2	2.2
	1993		0.1	0.7	0.9	1.7
	1994		0.2	1.7	2.2	4.1
	1995		0.3	3.0	3.8	7.1
	1996			0.2	0.3	0.5
	1997			0.2	0.3	0.5
0555	1977		0.2			0.2
	1981				0.1	0.1
	1984		0.7			0.7
	1985				2.8	2.8
	1987				16.8	16.8
	1988	0.4			0.7	1.1
	1989			0.5		0.5
	1991			0.2		0.2
	1992			0.3		0.3
	1993			0.2		0.2
	1994			0.5		0.5
	1995			0.9		0.9
	1996			0.1		0.1
	1997			0.1		0.1
1050	1959	0.2	0.5	2.5		3.2
	1960	0.2	0.5	2.5		3.2
	1961	0.2	0.5	2.5		3.2
	1962	0.2	0.6	3.3		4.1
	1963	0.1	0.3	1.5		1.9
	1964	0.1	0.4	1.9		2.4
	1965	0.2	0.5	2.7		3.4
	1966	0.1	0.4	2.4		2.9
	1967	0.4	1.3	7.3		9.0
	1968	0.3	1.0	5.2		6.5
	1969	0.1	0.4	2.2		2.7
	1970	0.1	0.4	2.3		2.8
	1971	0.1	0.4	1.9		2.4
	1972	0.1	0.2	1.2		1.5
	1973	0.2	0.7	3.8		4.7
	1974	0.5	1.6	8.9		11.0
	1975	0.3	0.8	4.3		5.4
	1976	0.3	0.9	4.9		6.1
	1977		0.7	0.4		1.1
	1984		1.4		0.3	1.7
	1985		0.3		0.3	0.6
	1986		0.2		1.9	2.1
	1987		5.7	8.7		14.4
	1988			0.5		0.5
	1990	6.5			0.8	7.3
	1991	3.1			0.4	3.5
	1992	3.6			0.4	4.0
	1993	2.7			0.3	3.0
	1994	6.6			0.8	7.4
	1995	11.4			1.4	12.8
	1996	0.9			0.1	1.0
	1997	0.9			0.1	1.0
1055	1981		0.1			0.1
	1984		0.3		3.5	3.8
	1985				0.5	0.5
	1986			0.5		0.5
	1987			0.4		0.4
	1989			0.1		0.1
	1990				1.2	1.2
	1991				0.6	0.6
	1992				0.7	0.7
	1993				0.5	0.5
	1994				1.2	1.2
	1995				2.1	2.1
	1996				0.2	0.2
	1997				0.2	0.2
1550	1959		1.5	1.2		2.7
	1960		1.5	1.2		2.7
	1961		1.5	1.2		2.7
	1962		1.9	1.5		3.4
	1963		0.9	0.7		1.6
	1964		1.1	0.9		2.0
	1965		1.6	1.3		2.9
	1966		1.4	1.1		2.5
	1967		4.3	3.4		7.7
	1968		3.1	2.4		5.5
	1969		1.3	1.0		2.3
	1970		1.4	1.1		2.5
	1971		1.1	0.9		2.0
	1972		0.7	0.5		1.2
	1973		2.3	1.8		4.1
	1974		5.2	4.2		9.4
	1975		2.6	2.0		4.6
	1976		2.9	2.3		5.2
1575	1981			1.0	0.1	1.1
	1987			0.2		0.2
1580	1982			1.7		1.7
2075	1986	0.1	0.6			0.7
2080	1981				0.9	0.9
	1982		0.1		1.4	1.5
	1984			0.5		0.5
	1986	0.2				0.2
2085	1984			1.0	0.4	1.4
	1985		1.3	13.0	0.4	14.7
	1986		0.4	5.2	1.9	7.5
	1987			6.7	1.1	7.8
2090	1987				2.4	2.4
2555	1959	0.3				0.3
	1960	0.3				0.3
	1961	0.3				0.3
	1962	0.4				0.4
	1963	0.2				0.2
	1964	0.2				0.2
	1965	0.3				0.3

	1966	0.3		0.3
	1967	0.9		0.9
	1968	0.6		0.6
	1969	0.3		0.3
	1970	0.3		0.3
	1971	0.2		0.2
	1972	0.1		0.1
	1973	0.5		0.5
	1974	1.1		1.1
	1975	0.5		0.5
	1976	0.6		0.6
2585	1986		1.2	1.2
	1987		3.1	3.1
2590	1986		0.7	0.7
	1987		1.7	1.7

Note: This is not a complete inventory of Cuban distant-water fishing, rather only swordfish catches in the Wider-Caribbean. A complete inventory covering all tuna and tuna-like species in all fishing areas is available at the ICCAT website at the URL listed in the source.
* ICCAT square are 5° degree squares of latitude and longitude. The first two numbers are the latitude and the second two numbers are the longitude. This represents the southeastern corner of the 5° square for catches in quadrant 4, northwest Atlantic.
Source: ICCAT website: http://www.iccat/es/Stats.html, retrieved July 3, 2000.

Appendix C8g1.--Major fishing countries. Swordfish catches in ICCAT 5° square 2075*, 1960-97

ICCAT Square*	Year	Quarter 1	2	3	4	Total
		Metric tons				
Cuba	1986	0.1	0.6			0.7
Japan	1965		0.1			0.1
	1969			0.1	0.1	0.2
	1971				0.2	0.2
	1975	0.2				0.2
	1984	0.1				0.1
Korea	No Korean fishing					
Spain	No Spanish fishing					
Taiwan	No Taiwan fishing					
United States	U.S. fishing data unavailable**					

* ICCAT square are 5° degree squares of latitude and longitude. The first two numbers are the latitude and the second two numbers are the longitude. This represents the southeastern corner of the 5° square for catches in quadrant 4, northwest Atlantic.
** The authors encountered apparent statistical problems with the U.S. data on the ICCAT web site. Apparently ICCAT is in the process of recalculating the 1° square data by 5° squares. As a result this data was not added to this appendix.
Source: ICCAT: http://www.iccat/es/Stats.html, retrieved July 3, 2000

Appendix C8g2.--Major fishing countries. Swordfish catches in ICCAT 5° square 2080*, 1960-97

ICCAT Square*	Year	Quarter 1	2	3	4	Total
		Metric tons				
Cuba	1981				0.9	0.9
	1982		0.1		1.4	1.5
	1984			0.5		0.5
	1986	0.2				0.2
Japan	1963				0.2	0.2
	1964		0.4			0.4
	1965			0.1	0.4	0.5
	1971			0.4	1.2	1.6
	1975			0.2		0.2
	1976		0.1			0.1
	1981	1.1				1.1
	1984	0.3				0.3
Korea	No Korean fishing					
Spain	No Spanish fishing					
Taiwan	No Taiwan fishing					
United States	U.S. fishing data unavailable**					

* ICCAT square are 5° degree squares of latitude and longitude. The first two numbers are the latitude and the second two numbers are the longitude. This represents the southeastern corner of the 5° square for catches in quadrant 4, northwest Atlantic.
** The authors encountered apparent statistical problems with the U.S. data on the ICCAT web site. Apparently ICCAT is in the process of recalculating the 1° square data by 5° squares. As a result, the authors were unable to add the U.S. data to this appendix.
Source: ICCAT: http://www.iccat/es/Stats.html, retrieved July 3, 2000

Appendix C9a.--Cuba. Tuna catch, smaller species, 1990-99

Year	Species: Little*	Skipjack	Blackfin	Total
		Metric tons		
1990	88	1,566#	487	2,141
1991	63	1,649#	318	2,030
1992	33	1,638#	196	1,867
1993	13	1,024#	54	1,090
1994	15	1,268#	223	1,506
1995	27	886#	146	1,059
1996	23	1,000	287	1,310
1997	17	1,282	301	1,600
1998	9	1,302	226	1,537
1999	-	750	309	1,059

* Atlantic black skipjack
# Most of the Cuban skipjack catch was taken by live-bait boats in Cuban coastal waters and referred to as the "bonito" fishery. Catches through 1995 were reported in the eastern Atlantic, presumably taken by purseseine operations. These catches were limited, ranging from 272 t in 1993 to only 5 t in 1995.
Source: FAO, *Yearbook of Fishery Statistics*, various years.

Appendix C9b.--Cuba. Tuna catch, major species, 1974-99

Year	Species		
	Albacore	Bigeye**	Yellowfin**
		Metric tons	
1963*	NA	NA	1,700#
1964*	NA	NA	900#
1965*	-		800
1966*	-	300	800
1967*	-	300	3,000
1968*	-	900	1,900
1969*	-	1,000	1,600
1970*	-	4,100	1,600
1971*	-	3,200	2,100
1972*	100	2,000	3,600
1973*	-	2,600	4,900
1974*	Negl	2,400	3,800
1975*	Negl	1,900	2,600
1976*	100	1,300	3,500
1977*	-	1,800	3,900
1978*	-	2,300	3,000
1979*	-	2,300	3,400
1980	58	1,385	5,817
1981	101	711	4,942
1982	111	521	3,754
1983	74	421	2,709
1984	136	447	4,005
1985	47	239	3,491
1986	54	170	3,343
1987	27	190	2,357
1988	6	151	1,792
1989	1	87	794
1990	4	62	851
1991	17	34	676
1992	5	56	664
1993	Negl	23	542
1994	0	7	252
1995	Negl	7	266
1996	0	5	297
1997	-	-	6
1998	-	-	14
1999	-	-	34

Note: Virtually the entire Cuban albacore and bigeye catch is taken by longlines. A small portion of the yellowfin catch is taken by pueseseines. See appendix C9c1.
F - FAO estimate
* For unknown reasons, the Cubans during these years provided only rough estimates (rounded numbers) for their catch.
** Bigeye and yellowfin are two very difficult species to tell apart. The authors are unsure as to the accuracy of the species identification.
# Includes bigeye.
Source: ICCAT, *Statistical Bulletin*, various years (1963-73) and FAO, *Yearbook of Fishery Statistics*, various years (1974-79 data).

Appendix C9c1.--Cuba. Yellowfin longline catch by fishing area, 1958-87

Year	Atlantic areas*		Gear			Total**
	East	West	Baitboat	Longline	Purseseine	
			1,000 Metric tons			
1958						
1959		-				-
1960		-				-
1961		-				-#
1962		-				-#
1963	-	1.7	NA	NA##	NA	1.7
1964	-	0.9	NA	NA##	NA	0.9
1965	0.5	0.2	NA	NA##	NA	0.7
1966	0.4	0.4	NA	NA##	NA	0.8
1967	2.4	0.6	NA	NA##	NA	3.0
1968	1.2	0.7	NA	NA##	NA	1.9
1969	0.9	0.6	NA	NA##	NA	1.5
1970	1.1	0.5	NA	NA##	NA	1.6
1971	1.4	0.3	NA	1.7	0.4	1.7
1972	3.2	0.4	-	3.6	NA	3.6
1973	4.5	-	-	4.5	0.4	4.9
1974	3.0	0.4	-	3.4	0.4	3.8
1975	1.7	0.6	-	2.3	0.3	2.6
1976	1.8	1.2	-	3.0	0.6	3.6
1977	2.9	0.9	-	3.8	0.1	3.9
1978	1.9	0.7	-	2.6	0.4	3.0
1979	2.6	0.2	-	2.8	0.6	3.4
1980	4.9	0.7	-	5.6	0.2	5.8
1981	2.5	2.0	-	4.5	0.4	4.9
1982	2.1	1.5	Negl	3.6	0.1	3.8
1983	1.6	0.8	-	2.4	0.3	2.7
1984	1.2	2.5	-	3.7	0.3	4.0
1985	1.1	1.9	-	3.0	0.5	3.5
1986	0.7	2.1	-	2.8	0.6	3.4
1987	0.8	1.1	-	1.8	0.5	2.4
1988	1.4	0.1	-	1.5	0.3	1.8
1989	0.4	0.1	-	0.5	0.3	0.8
1990	0.7	0.1	-	0.8	0.1	0.9
1991***	0.7F	Negl	NA	NA	NA	0.7F
1992	0.6F	Negl	NA	NA	NA	0.6F
1993	0.5F	Negl	NA	NA	NA	0.5F
1994	0.2F	Negl	NA	NA	NA	0.2F
1995	0.2F	0.1F	NA	NA	NA	0.3F
1996	0.3F	Negl	NA	NA	NA	0.3F
1997	0.3G	Negl	NA	NA	NA	0.3G

Note: Statistical discrepancies with appendix C9c2 are unexplained.
F - FAO data
G - ICCAT estimate
* Longline catches only during 1971-1990.
** Totals may not agree due to rounding.
*** Cuba stopped classifying catches by gear in 1991. The data thus includes both longline and purseseine catch.
# There probably were minor catches in these years.
While gear data is not available before 1972, most of the catch was taken by longlines.
Source: ICCAT, "Report of the Standing Committee on Research and Statistics," *ICCAT Report*, Part II, 1992-93 (ICCAT: Madrid, Spain, 1994), pp. 227-228 and ICCAT, *Statistical Bulletin*, (ICCAT: Madrid, various years).

Appendix C9c2.--Cuba. Yellowfin tuna catch by fishing area, 1970-97

Year	FAO area*		Total
	31	34	
	Metric tons		
1970	Negl	1,600	1,600
1971	-	1,700	1,700
1972	Negl	3,500	3,500
1973	-	4,900	4,900
1974	-	3,800	3,800
1975	500	2,100	2,600
1976	100	3,400	3,500
1977	-	3,900	3,900
1978	-	3,000	3,000
1979	-	3,400	3,400
1980	-	5,817	5,817
1981	-	4,942	4,942
1982	65	3,689	3,754
1983	793	1,916	2,709
1984	535	3,470	4,005
1985	312	3,179	3,491
1986	440	2,003	2,443
1987	225	2,132	2,357
1988	98	1,694	1,792
1989	91	703	794
1990	53	798	851
1991	18	658	676
1992	11	653	664
1993	1	541	542
1994	14	238	252
1995	54	212	266
1996	40	257	297
1997	6	-	6
1998	14	-	14

* FAO areas: 31 - Western central Atlantic and 34 - Eastern central Atlantic
Source: FAO, *Yearbook of Fishery Statistics*, various years.

Appendix C9d.--Cuba. Purseseine catch, 1982-89

Year	Species				Total
	Yellowfin	Bigeye	Little	Skipjack	
		Metric tons			
1971	400	-	-	200	600
1972	NA	-	-	100	NA
1973	400	-	-	NA	NA
1974	400	-	-	100	500
1975	30	-	-	300	330
1976	600	-	-	200	800
1977	100	-	-	100	200
1978	400	-	-	200	600
1979	600	-	-	100	700
1980	201	-	-	196	397
1981	403	-	-	198	601
1982	109	-	44	189	342
1983	349	36	-	135	520
1984	296	-	-	310	606
1985	450	-	-	246	696
1986	638	4	-	569	1,211
1987	526	-	-	81	607
1988	277	-	-	206	483
1989	265		30	331	626

1990	119	-	-	86	205
1991	NA	NA	NA	NA	NA
1992	NA	NA	NA	NA	NA
1993	-	36F	-	7F	43F
1994-99	NA	NA	NA	NA	NA

Note: Purseseine operations were almost entirely reported in the eastern Atlantic.
F - Based on FAO data. NA - Cuba reported its catch without classifying the gear types
Source: ICCAT, *Statistical Bulletin*, various years.

Appendix C10a1.--Cuba. Billfish catch, 1970-79

Species	Year									
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
	Metric tons									
Marlin										
Blue										
N. Atl	108	149	67	223	516	594	250	220	97	156
S. Atl	41	17	22	75	170	195	159	100	113	180
White										
N. Atl	61	45	34	112	256	294	68	67	43	68
S. Atl	8	4	6	21	48	55	38	57	127	205
Sailfish										
E. Atl	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
W. Atl	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Unspecified	100	51	30	100	229	262	185	156	120	191
Total	318	266	159	531	1,219	1,400	700	600	500	800

Note: Results reported by longline fishery
Source: ICCAT, *ICCAT Report*, 1986-87, Part II, (ICCAT: Madrid, Spain, 1988), p. 184-186.

Appendix C10a2.--Cuba. Billfish catch, 1980-89

Species	Year									
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
	Metric tons									
Marlin										
Blue										
N. Atl	162	178	318	273	214	246	103	68	94	74
S. Atl	187	108	118	123	159	205	111	137	191	77
White										
N. Atl	70	189	205	728	241	296	225	30	13	21
S. Atl	212	116	45	112	153	216	192	62	24	22
Sailfish										
E. Atl	NA	NA	158	200	115	19	55	50	22	53
W. Atl	NA	NA	181	28	169	130	50	171	78	55
Unspecified	198	213	-	-	-	-	-			
Total	829	804	1,025	1,464	1,051	1,112	736	518	422	302

Note: Results reported by longline fishery
Source: ICCAT, *ICCAT Report*, 1986-87, Part II, (ICCAT: Madrid, Spain, 1988), pp. 184-186 (1980-85 data) and ICCAT, *ICCAT Report*, 1992-93, Part II, (ICCAT: Madrid, Spain, 1993), pp. 254-258 (1986-89 data).

Appendix C10a3.--Cuba. Billfish catch, 1990-97

Species/gear	Year							
	1990	1991	1992	1993	1994	1995	1996	1997
	Metric tons							
Marlin								
Blue								
North Atlantic								
Longline	112E	50E	50E	-E	-E	-	-	-
Unclassified	-	77A	85A	69F	39F	85F	43F	NA
So. Atlantic								
Longline	90E	-	-	-	-	-	-	-
Other	-	62A	69A	-E	-E	-	-	-
White								
No. Atl	14E	-	-	-	-	-	-	-
So. Atl	6E	10E	10E	-E	-E	-	-	-
Sailfish								
E. Atlantic								
Longline	61E	-	-	-	-	-	-	-
Unclassified	-	184F	200F	77F	83E	72F	535F	NA
W. Atl								
Longline	126E	-	-	-	-	-	-	-
Unclassified	-	83F	70F	42F	46F	37F	37F	NA
Total	409	466	484	188	168	194	615	NA

Note: Most of the catch in the "Unclassified" category is probably taken in the longline fishery.
E - ICCAT estimate
F - FAO estimate
NA - The ICCAT 1997 *Statistical Bulletin* notes nil quantities, but this probably should have been not available.
Source: ICCAT, *Statistical Bulletin*, various years.

Appendix C10b.--Cuba. Billfish catch, 1980-98

Year	Catch	
	FAO	ICCAT
	Metric tons	
1980	829	829
1981	804	804
1982	1,025	1,025
1983	1,464	1,464
1984	1,051	1,051
1985	1,112	1,112
1986	726	726
1988	518	518
1988	422	422
1989	384	302
1990	410	409
1991	406	466
1992	424	484
1993	188	188
1994	168	168
1995	194	194
1996	613	613
1997	94	NA
1998	40	NA

Note: Part of the difference in the ICCAT and FAO statistics is that FAO does not list the white marlin catch as a separate species.
NA - Not available
Source: FAO, *Yearbook of Fishery Statistics*, various years and ICCAT, *Statistical Bulletin*, various years.

Paginization note: The production of the Cuban chapter was delayed because of the receipt of some important information. As a result, we did not correctly estimate the length of this chapter. This and subsequent pages of the appendix are thus numbered page 729 with a letter to indicate the different pages.

Appendix C10c1.--Cuba. Billfish catches, 1980-98

Year	Catch			Total
	Marlin		Sailfish	
	Blue	White		
	Metric tons			
1980	349	282	198	829
1981	286	305	213	804
1982	436	250	339	1,025
1983	396	840	228	1,464
1984	373	394	284	1,051
1985	451	545	116	1,112
1986	204	417	105	726
1987	205	92	221	518
1988	285	37	100	422
1989	233	43	108	384
1990	124	-	289	410
1991	139	Negl	267	406
1992	154	Negl	270	424
1993	69	Negl	119	188
1994	39	-	129	168
1995	85	-	109	194
1996	43	-	570	613
1997	53	-	41	94
1998	12	-	28	40

Source: FAO, *Yearbook of Fishery Statistics*, various years.

Appendix C10c2.--Cuba. Billfish catches, 1980-97

Year	Catch			Total
	Marlin		Sailfish	
	Blue	White		
	Metric tons			
1980	349	282	198	829
1981	286	305	213	804
1982	436	250	239	1,025
1983	396	840	228	1,464
1984	373	394	284	1,051
1985	451	545	116	1,112
1986	204	417	105	726
1987	205A	92A	221A	518
1988	285E	37E	100E	422
1989	151A	43E	108E	302
1990	202E	20E	187E	409
1991	189A	10E	267F	466
1992	204A	10E	270F	484
1993	69F	-E	119F	188
1994	39F	-E	129EF	168
1995	85F	-	105F	190
1996	43F	-	372F	415
1997	NA	-	NA	NA

A - Officially reported catches which have been further grouped by the ICCAT SCRS, a working group, or the Secretariat.
E - Estimate by the SCRS or SCRS working group. May include estimates by national scientists, or by the Secretariat, which have been reviewed and approved by the SCRS.
F - From appropriate FAO, *Yearbook of Fishery Statistics*, various years.
NA - Not available
Source: ICCAT, *Statistical Bulletin*, various years.

Appendix C10d1.--Cuba. Blue marlin catch, 1980-97

Year	FAO area			Total
	31	34	47	
		Metric tons		
1980	NA	NA	NA	NA
1981	108	178	-	286
1982	114	322	-	436
1983	184	212	-	396
1984	159	214	-	373
1985	51	400	-	451
1986	18	186	-	204
1987	16	189	-	205
1988	94	191	-	285
1989	42	191	-	233
1990	39	85	-	124
1991	43	96	-	139
1992	60	94	-	154
1993	7	62	-	69
1994	12	27	-	39
1995	41	44	-	85
1996	1	42	-	43
1997	53	-	-	53
1998	12	-	-	12

NA - Not available
FAO areas:
31: Western central Atlantic
34: Eastern central Atlantic
41: South eastern Atlantic
Source: FAO, *Yearbook of Fishery Statistics*, various years.

Appendix C10d2.--Cuba. Blue marlin catch, 1980-97

Year	ICCAT Atlantic area		Total
	Northern	Southern	
	Metric tons		
1980	162A	187A	349
1981	178A	108A	286
1982	315A	118A	433
1983	273A	123A	396
1984	214A	159A	373
1985	246A	205A	451
1986	103A	111A	214
1987	68A	137A	205
1988	94E	191E	285
1989	74A	77A	151
1990	112E	90E	202
1991	127EA	62A	189
1992	135EA	69A	204
1993	69F	-E	69
1994	39F	-E	39
1995	85F	-	85
1996	43F	-	43
1997	NA	NA	NA

A - Officially reported catches which have been further grouped by the ICCAT SCRS, a working group, or the Secretariat.
E - Estimate by the SCRS or SCRS working group. May include estimates by national scientists, or by the Secretariat, which have been reviewed and approved by the SCRS.
F - FAO, *Yearbook of Fishery Statistics*, various years.
Source: ICCAT, *Statistical Bulletin*, various years.

Appendix C10e1.--Cuba. White marlin catch, 1980-97

Year	FAO area			Total
	31	34	47	
		Metric tons		
1980	NA	NA	NA	NA
1981	116	189	NA	305
1982	45	205	NA	250
1983	112	728	NA	840
1984	153	241	NA	394
1985	296	216	NA	512
1986	234	183	NA	417
1987	84	8	NA	92
1988	24	13	NA	32
1989	22	21	NA	43
1990	Negl	Negl	NA	Negl
1991	Negl	Negl	NA	Negl
1992	Negl	Negl	NA	Negl
1993	Negl	Negl	NA	Negl
1994	-	-	NA	-
1995	-	-	NA	-
1996	-	-	NA	-
1997	-	-	NA	-
1998	-	-	NA	-

FAO areas:
31: Western central Atlantic
34: Eastern central Atlantic
41: South eastern Atlantic
Source: FAO, *Yearbook of Fishery Statistics*, various years.

Appendix C10e2.--Cuba. White marlin catch, 1980-97

Year	ICCAT Atlantic area		Total
	Northern	Southern	
		Metric tons	
1980	70E	212E	282
1981	189G	116G	305
1982	205G	45G	250
1983	729G	112G	841
1984	241G	153G	394
1985	269G	216G	485
1986	223A	192A	415
1987	30A	62A	92
1988	13E	24E	37
1989	21E	22E	43
1990	14E	6E	20
1991	-	10E	10
1992	-	10E	10
1993	-	-E	-
1994	-	-E	-
1995	-	-	-
1996	-	-	-
1997	NA	NA	NA

Note: The nil amounts indicated by dashes above may in fact be small or negligible quantities.
A - Officially reported catches which have been further grouped by the ICCAT SCRS, a working group, or the Secretariat.
E - Estimate by the SCRS or SCRS working group. May include estimates by national scientists, or by the Secretariat, which have been reviewed and approved by the SCRS.
F - From appropriate FAO, *Yearbook of Fishery Statistics*, various years.
Source: ICCAT, *Statistical Bulletin*, various years.

Appendix C10f1.--Cuba. Sailfish catch, 1980-97

Year	FAO area			Total
	31	34	41	
		Metric tons		
1980	-	-	-	-
1981	108	178	-	286
1982	114	322	-	550
1983	184	212	-	396
1984	159	214	-	373
1985	51	400	-	451
1986	18	186	-	204
1987	217	4	-	221
1988	76	22	-	98
1989	55	53	-	108
1990	52	234	-	286
1991	83	184	-	267
1992	70	200	-	270
1993	42	77	-	119
1994	46	83	-	129
1995	37	72	-	109
1996	37	533	-	570
1997	41	-	-	41
1998	28	-	-	28

FAO areas:
31: Western central Atlantic
34: Eastern central Atlantic
41: Southeastern Atlantic
Source: FAO, *Yearbook of Fishery Statistics*, various years.

Appendix C10f2.--Cuba. Sailfish catch, 1980-97

Year	ICCAT Atlantic area			Total
	Eastern	Western	Unclassified	
		Metric tons		
1980	-	-	-	-
1981	-	-	-	-
1982	158G	181G	198E	537
1983	200G	28G	-	228
1984	115G	169G	-	284
1985	19G	130G	-	149
1986	55A	50A	-	105
1987	50A	171A	221	442
1988	22E	78E	100	200
1989	53E	55E	108	216
1990	61E	126E	187	374
1991	184F	83F	267	534
1992	200F	70F	270	540
1993	77F	42F	119	238
1994	83E	46F	129	258
1995	72F	37F	105	214
1996	535F	37F	572	1144
1997	NA	NA	NA	NA

A - Officially reported catches which have been further grouped by the ICCAT SCRS, a working group, or the Secretariat.
E - Estimate by the SCRS or SCRS working group. May include estimates by national scientists, or by the Secretariat, which have been reviewed and approved by the SCRS.
F - From appropriate FAO, *Yearbook of Fishery Statistics*, various years.
G - ICCAT Secretariat estimates based on the best available sources.
Source: ICCAT, *Statistical Bulletin*, various years.

Appendix C11a.--Cuba. Shark and ray catches, 1980-98

Year	Catch				Total
	Dogfish	Large sharks	Skates*	Unspecified**	
	Metric tons				
1975	-	-	-	4,200	4,200
1976	-	-	-	3,900	3,900
1977	-	-	-	4,500	4,500
1978	-	-	-	2,700	2,700
1979	-	-	-	2,500	2,500
1980	-	-	-	3,077	3,077
1981	-	-	-	5,357	5,357
1982	-	-	-	4,571	4,571
1983	-	-	24	5,285	5,309
1984	-	-	-	4,315	4,315
1985	Negl	-	31	4,753	4,784
1986	Negl	-	-	3,427	3,427
1987	134	-	Negl	3,487	3,621
1988	Negl	-	Negl	3,301	3,301
1989	Negl	-	Negl	3,759	3,759
1990	Negl	-	Negl	3,129	3,129
1991	Negl	-	3	2,014	2,017
1992	41	-	Negl	2,796	2,837
1993	27	2	22	2,796	2,847
1994	-	-	Negl	3,391	3,391
1995	-	-	5	3,056	3,061
1996	-	-	955	2,460	3,415
1997	-	-	1,359	1,932	3,291
1998	-	-	1,336	1,737	3,073

* Skates and rays
** Unspecified sharks, rays, and skates
Source: FAO, *Yearbook of Fishery Statistics*, various years.

Appendix C11b.--Cuba. Unspecified shark catch, 1980-97

Year	FAO area			Total
	31	34	47	
	Metric tons			
1975	NA	NA	-	4,200
1976	3,600	300	-	3,900
1977	3,800	300	-	4,100
1978	2,200	400	-	2,600
1979	2,000	500	-	2,500
1980	2,504	573	-	3,077
1981	3,390	1,961	-	5,357
1982	3,327	1,244	-	4,571
1983	3,174	2,111	-	5,285
1984	3,000	1,315	-	4,315
1985	2,860	1,893	-	4,753
1986	2,665	753	-	3,418
1987	2,868	580	3	3,451
1988	2,568	733	-	3,301
1989	3,070	689	-	3,759
1990	1,885	1,244	-	3,129
1991	1,325	689	-	2,014
1992	1,314	1,482	-	2,796
1993	881	1,915	-	2,796
1994	1,383	2,008		3,391
1995	1,365	1,691	-	3,056
1996	1,409*	1,051	-	2,460*
1997	1,932	-	-	1,932
1998	1,737	-	-	1,737
1999	1,495	-	-	1,495

* 955 t of skates were reported in FAO area 31 during 1996 and larger quantities in subsequent years. This was the first notable catch of skates reported by Cuba. It might involve operational

or statistical readjustments. Notably the unidentified catch in area 34 declined in 1996.
FAO areas:
31: Western central Atlantic
34: Eastern central Atlantic
41: South eastern Atlantic
Source: FAO, *Yearbook of Fishery Statistics*, various years.

Appendix C11c.--Cuba. Shark bycatch in different fishing areas, 1980-97

Year	FAO area 31			FAO area 34		
	Shark	Swordfish	Relation*	Shark	Swordfish	Relation*
	Metric tons		Ratio	Metric tons		Ratio
1980	2,504	214	11.7	573	380	1.5
1981	3,396	15	21.4	1,961	215	9.1
1982	3,327	107	31.1	1,244	579	2.1
1983	3,174	116	27.4	2,111	1,112	1.9
1984	3,000	139	21.6	1,315	1,228	1.1
1985	2,860	148	19.3	1,893	1,315	1.4
1986	2,655	143	18.6	753	588	1.3
1987	2,868	982	2.9	580	101	5.7
1988	2,568	102	25.2	733	889	0.8
1989	3,070	95	32.3	689	822	0.8
1990	1,885	67	28.1	1,244	428	2.9
1991	1,325	54	24.5	689	178	3.9
1992	1,314	25	52.6	1,482	248	6.0
1993	881	8	110.1	1,915	20	9.6
1994	1,383	10	138.3	2,008	492	4.1
1995	1,365	15	91.0	1,691	849	2.0
1996	1,409**	5	281.8	1,051	62	17.0
1997	1,932	9	214.7	-	-	-
1998	1,737	10	173.7	-	-	-

* Ratio between the shark and swordfish catches. Note the substantial variations between areas and years. This suggests that the Flota Atunera de Cuba (FAC) in FAO area 34 has over time significantly modified fishing operations and methods. In FAO area 31 the historic high ratio probably reflects the coastal shark fishery which was not associated with the FAC commercial longline fleet.
** 955 t of skates were reported in FAO area 31 during 1996 and larger quantities in subsequent years. This was the first notable catch of skates reported by Cuba. It might involve operational or statistical readjustments. Notably the unidentified catch in area 34 declined in 1996.
Source: FAO, *Yearbook of Fishery Statistics*, various years.

Appendix C11d.--Cuba. Shark yields (CPUE) in kilograms per fishing day by species, 1971-73

Species			CPUE#			Average
English	Spanish	Scientific	1971	1972	1973	
			Metric tons			
Silky	Jaquetón	Carcharhinus falciformis	9.5	13.7	13.7	12.3
Shortfin mako	Dientuso azul	Isurus oxyrinchus	8.5	8.6	12.1	9.7
Night shark	Jesuita	C. signatus*	12.2	5.8	4.7	7.6
Bigeye thresher	Zorro	Alopias superciliosus	3.5	7.7	9.4	6.9
Oceanic whitetip	Galano	C. longimanus	3.7	3.3	3.3	3.4
Longfin mako	Dientuso prieto	I. paucus	2.7	2.9	NA	2.8
Hammerheads	Cornudas	Sphyrna spp.	1.7	1.7	1.2	1.8
Tiger	Tigre	Galeocerdo cuvieri	1.1	2.2	2.1	1.8
Dusky	Amarillo	C. obscurus	1.0	0.9	1.8	1.2
Blue	Azul	Prionace glauca	1.3	0.2	0.1	0.5
Bignose	Baboso	C. altimus	0.1	0.2	-	0.1

NA - Not available
Catch per unit effort in kilograms per fishing day.
* Formerly identified as *Hypoprion signatus*
Source: Dario Guitart Manday, "La pesquerias pelagico-oceanicas de corto radio de accion en la region noroccidental de Cuba," *Serie Oceanologica*, No. 31, 1975, p.5.

Appendix C11e.--Cuba. Shark catch by species, 1963

Species	Catch* 1963	Cuban Rank 1963	Cuban Rank 1971-73	U.S. Rank 1993**
	Percent			
Oceanic whitetip	25.4	1	5	4
Night shark	19.3	2	3	NS
Silky	14.2	3	1	1
Shortfin mako	11.7	4	2	6
Dusky	10.5	5	9	3
Bigeye thresher	6.2	6	4	7
Tiger	5.3	7	8	8
Bignose	3.2	8	11	NS
Hammerheads	3.1	9	7	5***
Blue	1.0	10	10	13
Longfin mako	-	11	6	9

Note: Sharks taken by the U.S. fishermen, but not reported in the most important species by the Cubans include: blacktip (rank 2), tiger (rank 8), and sandbar (rank 10) sharks.
NS - Not significant in the U.S. Gulf of Mexico longline fishery during 1993.
* Relative proportion of the shark catch by species
** Appendix C4c2.
*** Scalloped hammerhead.
Source: Dario Guitart Manday, "La pesquerias pelagico-oceanicas de corto radio de accion en la region noroccidental de Cuba," *Serie Oceanologica*, No. 31, 1975, p.6.

Appendix D1.--Cuba. Monthly ration allocation, 1999

Food	Quantity	Total price
	Pounds per month*	Pesos
Rice	6.00	1.50
Sugar	6.00	0.75
Legumes**	1.50	0.48
Coffee	0.25	0.80
Eggs	12 eggs	1.80
Meat	1.0-2.0	0.75-1.50
Cooking oil	0.13	0.15
Salt	1.00	0.10
Fish	1.0-2.0	1.00-4.00
Bread	0.18	0.05
Milk***	2.1 pints/day	0.50
Soy yogurt#	6.3 pints/week	3.00
Soap		
Laundry	1 bar	0.20
Bath	1 bar	0.25
Tooth pate	1 tube	0.65-1.00

Note the average Cuban monthly salary in 1999 was 220 pesos and the exchange rate was 21 pesos to the U.S. dollar.
* Unless otherwise specified
** Half peas and half beans
*** Through age 6
# age 7-13
Source: Karen DeYoung, "Cuba climbs economic ladder," *The Washington Post*, July 24, 2000, p. A20.

Appendix D2a.--Cuba. Annual per capita supply, 1980-97

Year	Supply	Year	Supply
	Kilograms		
1980	18.0	1990	17.8
1981	18.4	1991	13.9
1982	18.3	1992	12.0
1983	19.6	1993	12.9
1984	17.9	1994	11.3
1985	20.3	1995	12.6
1986	20.1	1996	12.1
1987	20.6	1997	12.6
1988	20.7		
1989	17.5		

Source: FAO, "Fish and fishery products: World apparent consumption statistics based on food balance sheets," *FAO Fisheries Circular*, No. 821, Revision 5, (FAO: Rome, 1999), p. 128.

Appendix D2b.--Caribbean. Comparative fish apparent per capita supply, 1961-97

Year	Per capita fish supply							
	Cuba	Barbados	Bahamas	D.R.	Grenada	Haiti	Jamaica	Trinidad
	Kg per capita							
1961	7.5	24.8	9.9	4.5	21.4	1.2	32.6	13.5
1965	9.7	22.0	15.2	6.0	28.4	1.3	31.4	14.8
1970	15.2	22.9	17.4	8.0	31.4	1.2	26.9	12.1
1975	21.1	28.7	15.0	5.4	33.2	1.8	26.1	10.7
1980	18.0	18.1	27.1	9.0	28.8	3.7	17.6	12.6
1985	20.3	22.1	31.2	8.0	33.7	4.4	16.1	16.0
1990	17.8	23.4	28.3	8.8	34.6	3.6	17.8	9.1
1991	13.9	23.8	25.0	6.3	38.2	2.4	15.6	14.0
1992	12.0	25.6	26.1	6.0	34.4	2.4	14.3	13.5
1993	12.9	24.7	25.9	7.2	32.0	2.6	16.1	8.7
1994	11.3	22.2	24.8	8.8	26.2	2.4	16.6	11.8
1995	12.6	23.9	29.6	7.9	22.4	2.7	17.1	11.8
1996	12.1	21.7	29.9	7.7	28.8	2.5	17.3	12.3
1997	12.6	20.4	31.8	8.6	20.1	2.6	11.7	12.4

Note: Data before 1961 are unavailable. Some estimates for the period prior to the 1960s understate consumption because of the extent of subsistence fishing.
Source: Edmondo Laureti, "Fish and fishery products: World apparent consumption statistics based on food balance sheets, 1961-97," *FAO Fisheries Circular*, No. 821, Revision 5 (FIDI/C821) (FAO: Rome, 1999).

Appendix D2c.--Caribbean. Comparative apparent fish per capita supply, 1997

Country	Per capita supply
	Kg per capita
Bahamas	31.8
Barbados	20.4
Grenada	20.1
Cuba	12.6
Trinidad	12.4
Jamaica	11.7
Dominican Rep.	8.6
Haiti	2.6

Source: Edmondo Laureti, "Fish and fishery products: World apparent consumption statistics based on food balance sheets, 1961-97," *FAO Fisheries Circular*, No. 821, Revision 5 (FIDI/C821) (FAO: Rome, 1999).

Appendix E1a1.--Cuba. Fishery exports, 1958-99

Year	Estimates		Year	Estimates	
	FAO	Other		FAO	Other*
		US$ Million			
1958	5		1980	124	
1959	NA		1981	121	
			1982	116	
1960	1		1983	125	
1961	3		1984	102	
1962	2				
1963	1		1985	127	
1964	1		1986	146#	
			1987	142	
1965	3		1988	146#	
1966	4		1989	129	127
1967	5				
1968	8		1990	101	125
1969	13		1991	130	115
			1992	111	120
1970	19		1993*	73	90
1971	21		1994	103	110
1972	26				
1973	34		1995	127	
1974	49		1996	130	
			1997	98	
1975	51		1998	98	
1976	64		1999	93	
1977	65				
1978	108				
1979	132				

All time records.
* Cuba in 1993 allowed Cuban citizens to hold dollars. Previously mere possession of dollars could mean a jail term. Since 1993 Cuba export data often includes domestic sales for dollars. Depending on precisely how the data is to be used, the set including domestic dollar sales may be a more accurate view of exports than the more traditional measure computed by FAO.
Sources: FAO. *Yearbook of Fishery Statistics*, various years (FAO data) and *Anuario Estadístico de Cuba* and official data from trading partners (other data).

Appendix E1a2.--Cuba. Fresh and frozen fish exports, 1958-98

Year	Exports	Year	Exports
	US$ Million		
1958	1.6	1980	31.0#
1959	NA	1981	18.2
		1982	17.8
1960	NA	1983	22.0
1961	NA	1984	10.7
1962	-*		
1963	-	1985	14.9
1964	-	1986	12.5
		1987	5.0
1965	-	1988	5.4
1966	-	1989	4.4
1967	-		
1968	0.3**	1990	3.2
1969	1.1	1991	3.1
		1992	0.1
1970	3.1	1993	0.1
1971	3.2***	1994	1.9
1972	3.8		
1973	6.3	1995	4.1
1974	8.8	1996	2.6
		1997	0.8
1975	4.9	1998	0.7
1976	6.0		
1977	6.8		
1978	18.1****		
1979	25.1		

Note: The data here is statistics that Cuba has forwarded to FAO. Tuna and swordfish transhipments through la Palmas should be included. The authors are unsure to what extent such transhipments have been included in Cuban foreign trade data.
* Acquisition of first commercial longliners appears to have had little affect on exports.
** Acquisition of large fleet of Spanish longliners appears to have had an impact on exports, especially by 1969.
*** Cuba had to withdraw from its Las Palmas base in 1971-73 because of political and trade disputes with the Spanish Government. The reason for the large increase in fish exports in 1978-79 is unknown.
**** The major development in Cuba was the acquisition of a large fleet of Rio Damuji-class factory trawlers in Spain beginning in 1975.
# All time records.
Sources: FAO. *Yearbook of Fishery Statistics*, various years.

Appendix E1a3.--Cuba. Fresh and frozen crustacean exports as a share of the total, 1965-98

Year	Exports		Proportion*
	Crustaceans	Total fishery	
	US$ Million		Percent
1960	NA	NA	NA
1965	1	3	34
1970	13	19	68
1975	46	51	90
1980	89	124	71
1985	110	127	87
1990	97	101	96
1995	121	127	95
1996	125	130	96
1997	95	98	97
1998	96	98	98

* Portion of exports provided by fresh and frozen crustaceans (mostly frozen lobster).
Source: FAO. *Yearbook of Fishery Statistics*, various years.

Appendix E1b.--Cuba. Fishery trade balance, 1994-98

Year	Quantity			Value			Proportion
	Exports	Imports	Balance	Exports	Imports	Balance	
	1,000 Metric tons			US$ Million			Percent
1995	12.4	53.4	41.0	126.7	27.3	99.4	22
1996	11.9	35.6	23.7	130.3	22.0	108.3	17
1997	9.6	28.4	18.8	97.6	16.7	80.9	17
1998	8.2	35.8	27.6	98.0	24.0	74.0	24

Sources: FAO. *Yearbook of Fishery Statistics*, various years.

Appendix E2.--Cuba. Swordfish exports by destination, 1991-99

Destination	Year									
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
	Metric tons									
United States	-	-	-	-	-	-	-	-	-	-
Japan*	-	-	-	-	-	-	-	-	-	-**
European Union	NA	117	-	55	-	219	313	109	-	-**
Others***	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total	NA	117	-	55	-	219	313	109	-	-

* Estimated swordfish portion of billfish shipments
** Preliminary
*** Swordfish shipments to other countries are believed to be non-existent or negligible. Cuban sources indicate that a new state company, Grupo Caribe, has been created to market seafood in the Caribbean. The results achieved, however, are unknown.
Source: Various

Appendix E3.--European Union. Swordfish imports from Cuba, 1991-98

Country	Commodity	Year								
		1991	1992	1993	1994	1995	1996	1997	1998	1999
		Metric tons								
Spain	Frozen trunks	117	-	55	-	219	313	109	-	-*
Total		117	-	55	-	219	313	109	-	-*

* Preliminary.
Source: EU. Eurostat data.

Appendix E4a.--Japan. Swordfish and billfish imports from Cuba, 1986-97

Year	Quantity	
	Billfish	Swordfish
	Metric tons	
1986	834	417E
1987	79	40E
1988	203	102E
1989	253	127E
1990	-	-
1991	-	-
1992	-	-
1993	-	-
1994	-	-
1995	-	-
1996	-	-
1997	-	-
1998	-	-
1999	-*	-*

E - Estimated swordfish proportion of billfish imports. The authors have no data on the actual composition of these shipments. The estimate is based on the fact that available data on the species composition of Cuban longliners in their Atlantic operations reported billfish catches about equal to swordfish catches (appendix C4b). Of course this is highly speculative. Only limited catch composition data is available and there is no way of knowing what the actual composition of exports to Japan were. The estimate does represent a bench mark figure. Off Cuba itself more billfish were taken (appendices C4a3b and C4b), but this probably would not have been shipped to Japan.
* Preliminary
Source: Japan Tariff Association, *Japan Exports & Imports*, various years.

Appendix E4b.--Japan. Comparative nominal prices of frozen swordfish*, excluding fillets, imports, 1975-90

Year/ country	Value	Quantity	Nominal price
	Million Yen	Metric tons	Yen/Kg
1975#			
Taiwan	1,880.7	6,023.1	312
Korea	2,778.3	9,061.5	307
Panama**	311.0	1,090.7	285
Taiwan**	8.0	32.5	247
N. Ant**	107.0	480.0	223
Cuba	115.7	530.2	218
All countries	5,636.7	19,116.7	295
1980			
Taiwan	1,990.0	4,406.3	452
Brazil	182.4	420.6	430
Panama**	151.4	379.7	400
Korea	3,293.6	8,390.1	393
Cuba	21.7	65.1	330
N. Ant.**	41.1	138.0	300
All countries	6,221.4	15,079.2	410
1985			
Taiwan	2,127.3	3,608.3	590
Brazil	0.3	0.8	430
Panama**	209.5	529.1	400
Korea	1,778.4	4,650.5	382
Honduras**	22.9	68.1	340
N. Ant.**	149.3	438.4	340
Cuba	101.0	400.6	250
All countries	4,977.2	11,156.0	450
1989			
Taiwan	1,568.4	4,220.5	372
Venezuela	49.0	142.7	343
Cuba	85.5	250.1	342
Panama**	259.6	762.7	340
Cayman**	19.7	58.3	338
Korea	1,468..3	4,516.3	325
Honduras**	200.2	683.9	293
St. Vincent**	0.8	2.8	286
N. Ant.**	2.2	9.9	222
All countries	4,537.6	13,933.2	326
1990			
Taiwan	1,812.3	5,060.9	358
Venezuela	29.3	84.0	349
Panama**	342.8	1,042.7	329
Korea	1,128.9	3,681.4	307
N. Ant.**	2.1	7.0	300
Honduras**	188.6	704.8	268
Cayman**	7.8	30.8	253
St. Vincent**	10.1	40.4	250
Cuba	-	-	-
All countries	4,340.8	13,554.7	320

The entry in 1975 was a basket category combining fresh, chilled, and frozen product.
Note: The comparative prices for tuna in E4c are probably more reliable than the data here as marlins and billfish are included in this category and the shipments from different countries will have varying species mixes.
* Tariff code category 03.01.268 which incudes marlin and other billfish.
** Flag of convenience vessels
Source: Japan Tariff Association, *Japan Exports & Imports*, various years.

Appendix E4c.--Selected countries. Tuna shipments to Japan, 1975-80

Year/species country	Value	Quantity	Nominal price*
	Million Yen	Metric tons	Yen/Kg
1975--Tuna**			
Korea	14,306.8	35,146.2	407
Taiwan	2,005.7	7,749.7	259
Cuba	35.4	174.2	203
All countries	17,900.2	48,427,.6	370
1976: Data unavailable			
1977--Frozen yellowfin, excluding fillets			
Korea	16,762.9	30,852.9	543
Taiwan	1,119.5	2,384.8	469
Cuba	2.2	10.2	217
All countries	19,074.2	37,332.6	511
1977--Frozen bigeye, excluding fillets			
Korea	21,253.7	36,522.0	582
Taiwan	2,804.8	7,730.3	363
Cuba***	1.6	4.7	337
All countries	24,959.2	46.454.4	537
1978: No Cuban frozen yellowfin or bigeye shipped to Japan			
1979: No Cuban frozen yellowfin shipped to Japan			
1979--Frozen bigeye, excluding fillets			
Korea	19,685.1	30,241.3	651
Taiwan	3,533.3	8,563.8	413
Brazil	275.4	646.9	425
Cuba	1.4	6.4	220
All countries	25,880.0	43,273.7	598
1980: No Cuban frozen yellowfin or bigeye shipped to Japan			

* Based on data before rounding
** Basket category, separate yellowfin and bigeye data unavailable
*** Cuba obtained a price for bigeye in 1977 that was close to the price received by the Taiwan fishermen. The quantity was quite small. We are not sure how representative these shipments were.
Source: Japan Tariff Association, *Japan Exports & Imports*, various years.

Appendix E5.--United States. Lobster imports from Panama, 1990-98

Year	Panamanian catch*	Imports	
		Quantity**	Value
	Metric tons		US$ million
1990	300	329	8.4
1991	384	316	7.9
1992	323	312	7.1
1993	280	75	1.0
1994	279	62	1.2
1995	197	79	1.7
1996	291	51	0.9
1997	309	79	1.6
1998	417	94	1.9
1999	NA	102	2.1

NA - Not available
* Live weight
** Product weight, the actual live-weight equivalents will be substantially larger.
Source: FAO, *Yearbook of Fishery Statistics*, various years (catch data) and U.S. Bureau of the Census (trade data).

Appendix F1a.--United States. Estimated fish catch in longline fishing effort, 1993

Area	Species		Individuals*	Kept	Discarded		Catch
	Common Name	Scientific Name			Dead	Alive	share
			Number		Percent		
Gulf of Mexico							
	Yellowfin tuna	Thunnus albacares	29,024	0.91	0.07	0.02	34.43
	Swordfish	Xiphias gladius	13,247	0.32	0.50	0.18	15.71
	Lancetfish	Alephisauridae	6,419	0.00	0.80	0.20	7.61
	Skates/rays	Chondrichthyes	6,116	0.00	0.07	0.93	7.25
	Escolar	Lepidocybium flavobrunneum	4,402	0.72	0.19	0.08	5.22
	Dorado#	Coryphaenidae	4,126	0.88	0.04	0.08	4.89
	Atlantic sailfish	Istophorus platypterus	3,190	0.00	0.74	0.26	3.78
	Silky shark	Carcharhinus falciformis	2,043	0.05	0.56	0.39	2.42
	Wahoo	Acanthocybium solandri	2,017	0.96	0.03	0.01	2.39
	White marlin	Tetrapturus albidus	1,885	0.00	0.66	0.34	2.24
	Blue marlin	Makaira nigercans	1,384	0.00	0.47	0.53	1.65
	Shark (unidentified)	Carcharinidea	1,094	0.02	0.08	0.89	1.30
	Bigeye tuna	Thunnus obesus	883	0.94	0.06	0.00	1.05
	Blackfin tuna	Thunnus atlanticus	830	0.35	0.52	0.13	0.99
	Pomphret	Bramidae	646	0.33	0.35	0.33	0.77
	Skipjack tuna	Katsuwonus pelamis	619	0.21	0.77	0.02	0.74
	Tuna (unidentified)		606	0.00	0.96	0.04	0.72
	Eel	Ophichthidae	580	1.00	0.00	0.00	0.69
	Blacktip shark	Carcharhinus limbatus	540	0.02	0.34	0.63	0.64
	Dusky shark	Carcharhinus obscurus	474	0.33	0.22	0.44	0.56
	Oil fish	Ruvetus pretiosus	395	0.27	0.53	0.20	0.47
	Sunfish	Mola sp.	290	0.00	0.00	1.00	0.34
	Ocean whitetip shark	Carcharhinus longlimanus	290	0.05	0.41	0.55	0.34
	Scallop hammerhead	Sphyrna lewini	277	0.00	0.67	0.33	0.33
	Shortfin mako	Isurus oxyrinchus	264	0.70	0.15	0.15	0.31
	Bigeye thresher shark	Alopias superciliosus	250	0.42	0.21	0.37	0.30
	Fish (unidentified)		237	0.00	0.00	1.00	0.28
	Tiger shark	Galeocerdo cuvieri	224	0.12	0.00	0.88	0.27
	Bluefin tuna	Thunnus thynnus	198	0.27	0.47	0.27	0.24
	Longnose spearfish	Tetrapturus pfluegeri	132	0.00	0.90	0.10	0.16
	Snake mackerel	Trichiuridae	132	0.20	0.50	0.30	0.16
	Bonito	Sarda sarda	132	0.10	0.70	0.20	0.16
	Billfish (unidentified)	Idstiophoridae	119	0.00	0.44	0.56	0.14
	Barracuda	Sphyraenidae	119	0.44	0.22	0.33	0.14
	Bigeye cigarfish	Cupiceps spp	119	0.22	0.44	0.33	0.14
	Little tuny	Euthynnus alletteratus	119	0.00	0.89	0.11	0.14
	Puffer	Tetraodontidea	92	0.00	0.29	0.71	0.11
	Longfin mako	Isurus paucus	92	0.43	0.43	0.14	0.11
	Sanbar shark	Carcharhinus milberti	79	0.33	0.33	0.33	0.09
	Albacore tuna	Thunnus alalunga	66	1.00	0.00	0.00	0.08
	Sand tiger shark	Odontaspis taurus	53	0.00	0.25	0.75	0.06
	Spinner shark	Carcharhinus brevipinna	53	0.00	0.25	0.75	0.06
	Opah	Lampris guttatus	40	0.67	0.00	0.33	0.05
	Blue shark	Prionace glauca	26	0.50	0.00	0.50	0.03
	Bull shark	Carcharhinus leucas	26	0.00	1.00	0.00	0.03
	Smooth hammerhead	Sphyrna zygarna	26	0.00	0.50	0.50	0.03
	Hammerhead (unident.)	Sphyrna spp.	26	0.00	0.00	1.00	0.03

Common thresher shark	Alopius vulpinus	26	0.00	0.50	0.50	0.03
Spearfish	Tetrapterus sp.	13	0.00	0.00	1.00	0.02
Cobia	Rachycentron canadum	13	0.00	0.00	1.00	0.02
Amber jack	Seriola sp.	13	1.00	0.00	0.00	0.02
Grouper	Epinephelus	13	1.00	0.00	0.00	0.02
Thresher shark	Alopias sp.	13	0.00	1.00	0.00	0.02

* 1993 catch estimated from observer catch rates and reported effort
# Dolphinfish
Source: Jean Cramer, "Large pelagic logbook newsletter - 1994," *NOAA Technical Memorandum*, NMFS-SEFSC-378 (NMFS, Southeast Fisheries Science Center: Miami, November, 1995), p. 29.

Appendix F1b.--United States. Estimated fish catch in longline fishing effort, 1993

Area	Species		Individuals*	Kept	Discarded		Catch
	Common Name	Scientific Name			Dead	Alive	share
			Number	Percent			
Gulf of Mexico							
Tunas							
	Yellowfin tuna	Thunnus albacares	29,024	0.91	0.07	0.02	34.43
	Bigeye tuna	Thunnus obesus	883	0.94	0.06	0.00	1.05
	Blackfin tuna	Thunnus atlanticus	830	0.35	0.52	0.13	0.99
	Skipjack tuna	Katsuwonus pelamis	619	0.21	0.77	0.02	0.74
	Tuna (unidentified)		606	0.00	0.96	0.04	0.72
	Bluefin tuna	Thunnus thynnus	198	0.27	0.47	0.27	0.24
	Little tuny	Euthynnus alletteratus	119	0.00	0.89	0.11	0.14
	Albacore tuna	Thunnus alalunga	66	1.00	0.00	0.00	0.08
	Subtotal, tuna						38.39
Swordfish		Xiphias gladius	13,247	0.32	0.50	0.18	15.71
Billfish							
	Atlantic sailfish	Istophorus platypterus	3,190	0.00	0.74	0.26	3.78
	White marlin	Tetrapturus albidus	1,885	0.00	0.66	0.34	2.24
	Blue marlin	Makaira nigercans	1,384	0.00	0.47	0.53	1.65
	Longnose spearfish	Tetrapturus pfluegeri	132	0.00	0.90	0.10	0.16
	Billfish (uniden.)	Idstiophoridae	119	0.00	0.44	0.56	0.14
	Spearfish	Tetrapterus sp.	13	0.00	0.00	1.00	0.02
	Subtotal, billfish						7.99
Lancetfish		Alephisauridae	6,419	0.00	0.80	0.20	7.61
Sharks							
	Silky shark	Carcharhinus falciformis	2,043	0.05	0.56	0.39	2.42
	Shark (unidentified)	Carcharinidea	1,094	0.02	0.08	0.89	1.30
	Blacktip shark	Carcharhinus limbatus	540	0.02	0.34	0.63	0.64
	Dusky shark	Carcharhinus obscurus	474	0.33	0.22	0.44	0.56
	Ocean whitetip shark	Carcharhinus longlimanus	290	0.05	0.41	0.55	0.34
	Scallop hammerhead	Sphyrna lewini	277	0.00	0.67	0.33	0.33
	Shortfin mako	Isurus oxyrinchus	264	0.70	0.15	0.15	0.31
	Bigeye thresher shark	Alopias superciliosus	250	0.42	0.21	0.37	0.30
	Tiger shark	Galeocerdo cuvieri	224	0.12	0.00	0.88	0.27
	Longfin mako	Isurus paucus	92	0.43	0.43	0.14	0.11
	Sanbar shark	Carcharhinus milberti	79	0.33	0.33	0.33	0.09
	Sand tiger shark	Odontaspis taurus	53	0.00	0.25	0.75	0.06
	Spinner shark	Carcharhinus brevipinna	53	0.00	0.25	0.75	0.06
	Blue shark	Prionace glauca	26	0.50	0.00	0.50	0.03
	Bull shark	Carcharhinus leucas	26	0.00	1.00	0.00	0.03
	Smooth hammerhead	Sphyrna zygarna	26	0.00	0.50	0.50	0.03
	Hammerhead (unident.)	Sphyrna spp.	26	0.00	0.00	1.00	0.03
	Common thresher shark	Alopius vulpinus	26	0.00	0.50	0.50	0.03
	Thresher shark	Alopias sp.	13	0.00	1.00	0.00	0.02
	Subtotal, shark						6.96
Snake mackerels							
	Escolar	Lepidocybium flavobrunneum	4,402	0.72	0.19	0.08	5.22
	Oil fish	Ruvetus pretiosus	395	0.27	0.53	0.20	0.47
	Snake mackerel	Trichiuridae	132	0.20	0.50	0.30	0.16
	Subtotal, snake mackerels						5.85

Skates/rays	Chondrichthyes	6,116	0.00	0.07	0.93	7.25
Dorado#	Coryphaenidae	4,126	0.88	0.04	0.08	4.89
Wahoo	Acanthocybium solandri	2,017	0.96	0.03	0.01	2.39
Pomphret	Bramidae	646	0.33	0.35	0.33	0.77
Eel	Ophichthidae	580	1.00	0.00	0.00	0.69
Sunfish	Mola sp.	290	0.00	0.00	1.00	0.34
Bonito	Sarda sarda	132	0.10	0.70	0.20	0.16
Barracuda	Sphyraenidae	119	0.44	0.22	0.33	0.14
Bigeye cigarfish	Cupiceps spp	119	0.22	0.44	0.33	0.14
Puffer	Tetraodontidea	92	0.00	0.29	0.71	0.11
Opah	Lampris guttatus	40	0.67	0.00	0.33	0.05
Cobia	Rachycentron canadum	13	0.00	0.00	1.00	0.02
Amber jack	Seriola sp.	13	1.00	0.00	0.00	0.02
Grouper	Epinephelus	13	1.00	0.00	0.00	0.02
Fish (unidentified)		237	0.00	0.00	1.00	0.28

* 1993 catch estimated from observer catch rates and reported effort.
# Dolphin fish
Source: Jean Cramer, "Large pelagic logbook newsletter - 1994," *NOAA Technical Memorandum*, NMFS-SEFSC-378 (NMFS, Southeast Fisheries Science Center: Miami, November, 1995), p. 29.

Appendix F2a.--Cuba. Presence of turtles off Cuba

Species		Presence	Nesting	Feeding
English	Spanish			
Green	Verde	Continual	Common	Common
Loggerhead	Caguama	Continual	Common	Common
Hawksbill	Carey	Continual	Common	Common
Leatherback	Tinglado	Uncommon	Possible*	Probable
Ridleys				
Olive	Golfina	Rare*	NR	Rare
Kemp's	Lora	NR	NR	NR

NR - No records
* 2 records
Source: Elvira Carrillo and Félix Moncada G., "Annex I. Cuban sea turtles," *Revista Cubana de Investigaciones Pesqueras*, January-June 1998, Vol. 22, no. 1, p. 60.

Appendix F2b.--United States. Loggerhead and leatherback turtles taken by longliners in or near Cuban waters, 1998-99

Coordinate	1998		1999	
	Loggerheads	Leatherback	Loggerheads	Leatherbacks
	Interactions			
20°N 73°W	5	2	9	6
20°N 74°W	-	-	2	1
21°N 74°W	-	-	1	-
21°N 85°W	-	2	-	-
23°N 82°W	-	1	-	-
24°N 84°W	-	1	-	-
25°N 84°W	-	2	1	1
Total	5	8	13	8

Note: Details on turtle interactions around Puerto Rico and the U.S. Virgin Islands are available in the Puerto Rican chapter of this report (Puerto Rico, appendix G2c1). Details on turtle interactions in the Atlantic east of the Caribbean are available in the Puerto Rican chapter of this report (Puerto Rico, appendix G2c2).
Source: NMFS data.

Appendix F2c1.--Cuba. Sea turtle catches, 1976-99

Year	Species				Total
	Green	Hawksbill	Loggerhead	Other	
	Metric tons				
1976	300	200	300	NA	800
1977	300	200	300	NA	800
1978	300	200	300	-	800
1979	200	200	300	-	700
1980	269	263	320	28	880
1981	235	253	249	177	914
1982	376	285	260	1	922
1983	354	263	273	34	924
1984	211	291	277	39	818
1985*	513	322	322	30	1,187
1986	346	302	309	25	982
1987	291	277	239	28	835
1988	262	248	185	8	703
1989	289	245	142	15	691
1990	389	229	123	20	761
1991	212	175	84	11	482
1992	258	193	64	12	527
1993	122	117	48	8	295
1994	115	45	23	4	187
1995	46	20	11	22	99
1996	34	23	10	1	68
1997	18	19	7	Negl	44
1998	20	18	7	1	46
1999	8	12	5	-	25

* The 1985 Cuban turtle harvest was unusually high. Cuban scientists were not convinced that the open/closed season times were the best compromise for all three species (green, hawksbill, and loggerhead) being harvested. As a result, officials allowed harvests to be conducted through their breeding season so that biologists could obtain definitive data on the breeding cycles of each species. This data was subsequently used to change the harvest seasons. Grahame Webb, Director, Wildlife Management International, personal communications, January 23, 2001.
Source: FAO, *Yearbook of Fishery Statistics*, various years.

Appendix F2c2.--Cuba. Hawksbill catches, 1935-95

Year	Catch	Year	Catch
	Metric tons*		
1935	80.2**	1970	175.9
1936	80.2**	1971	205.9
1937	80.2**	1972	221.8
1938	80.2**	1973	279.1
1939	80.2**	1974	273.0
1940	11.3#	1975	278.9
1941	12.8	1976	204.9
1942	13.7	1977	202.2
1943	4.5	1978	202.0
1944	33.5	1979	202.9
1945	30.0	1980	263.1
1946	NA	1981	253.1
1947	NA	1982	285.2
1948	NA	1983	263.3
1949	NA	1984	253.0
1950	10.8	1985	321.6
1951	17.1	1986	241.5
1952	30.3	1987	277.4
1953	35.0	1988	247.3
1954	52.0	1989	244.9
1955	66.7	1990	229.0
1956	NA	1991	175.0
1957	NA	1992	192.8
1958	293.7	1993	117.0
1959	309.4	1994	45.2
1960	171.9	1995	18.9
1961	171.9		
1962	68.8		
1963	137.5		
1964	44.8		
1965	137.5		
1966	103.1		
1967	103.1##		
1968	300.0###		
1969	225.4		

Note: Hawksbills are not believed to be heavily affected by longlines. The long-term data available for this species, however, probably reflect generalized catch patterns that have affected other species which are affected by longlines, such as loggerheads. In addition all sea turtles are affected by a variety of artisanal fisheries.
NA - Not available
* Cuban estimates. Procedure for these estimates have varied over time and are explained in the source.
** 1935-39 data are the annualized mean.
# The sharp decline was presumably due to disrupted export markets as a result of World War II.
The data is only estimates, but an auditor would be somewhat skeptical that in a 5 year period (1963-67), two numbers would appear twice--especially given the quantitative range (44.8-137.5 t).
Changes in the method used to estimate the catch (live-weight) may be in part the cause of the significant apparent increase in 1968. The formal management of the fishery by the Government in 1968 may be another factor.
Source: Elvira Carrillo C., Félix Moncada G., Silvio Elizalde R., Gonzalo Nodarse A., Carlos Pérez P., and Ana María Rodríguez, "Anexo 4. Datos de las capturas históricas, el comercio y los muestros," *Revista Cubana de Investigaciones Pesqueras*, January-June 1998, pp. 75-76.

Appendix F2d.--Cuba. Sea turtles, comparative Caribbean* regional catches, 1990-98

Species/ country	Year 1990	1991	1992	1993	1994	1995	1996	1997	1998
	Metric tons								
Green									
Cuba	389	212	258	122	115	46	34	18	20
Grenada	4	8	11	8	4	7	8	6	6
Venezuela	Negl	Negl	Negl	Negl	Negl	Negl	Negl	Negl	Negl
Total	393	220	269	130	119	53	42	24	26
Hawksbill									
Cuba	229	175	193	117	45	20	23	19	18
Venezuela	Negl	Negl	Negl	Negl	Negl	Negl	Negl	Negl	Negl
Total	229	175	193	117	45	20	23	19	18
Loggerhead									
Cuba	123	84	64	48	23	11	10	7	7
Venezuela	Negl	Negl	Negl	Negl	Negl	Negl	Negl	Negl	Negl
Total	123	84	64	48	23	11	10	7	7
Other**									
Bahamas	12	8	6	4	2	2	3	3	3
Costa Rica	10F	Negl	43	NA	113	101	149	Negl	Negl
Cuba	20	11	12	8	4	22	1	Negl	1
Guadeloupe	20F	20F	10F	10F	5F	Negl	Negl	Negl	Negl
Martinique	1F	2F	2F	Negl	Negl	Negl	Negl	Negl	Negl
Puerto Rico	-	-	Negl	Negl	Negl	Negl	Negl	Negl	Negl
Venezuela	Negl	Negl	Negl	Negl	Negl	Negl	Negl	Negl	Negl
Total	63	41	73	22	124	125	153	3	4
Area total	808	520	599	317	311	209	228	53	55

Note: This data is based primarily on data provided by each country to FAO. The accuracy is based on the strength of the data collection system in each country. Some countries, such as Honduras and Nicaragua where turtles are known to be taken, did not report any Caribbean catches.
* FAO are 31 (western central Atlantic). The countries noted here would have taken virtually all of their turtle catch in the wider-Caribbean.
** Other species or unidentified turtle catch.
Source: FAO, *Yearbook of Fishery Statistics*, 1998.

Appendix F3.--Cuba. Seabird nesting, 1984

Area	Information	Species*	Known** threats	Importance***
Cuba				
Mainland	Poor	1; 6	Ha?, Pr?, ?	Important
North coast	Poor	7?, 10, 11-14?, 16-17?, 18-20, 22	?, Ex?	Important
South coast	Poor	7?, 10, 11-12?, 13-14, 16?, 19?-20? 22	?, Ex?	Important

* Species: 1 - Pterodroma h. hasitata; 6 - P. lepturus; 7 - Fregata magnificens; 10 - Sula leucogaster; 11 - Pelecanus occidentalis; 12 - Larus atricilla; 13 - Sterna maxima, 14 - S. sandvicensis acuflavida; 16 - S. dougallii; 17 - S. hiundo; 18 -S. anaethetus; 19 - S. fuscata; 20 - S. (albifrons) antillarum; 22 - A. stolidus
** Threats: Ex - exploitation of eggs, young or adults; Pr - predators, generally introduced mammals; Ha - habitat destruction or disturbances; Po - pollution; Fi - fisheries
*** A rough subjective rating of relative importance of area for breeding seabirds.
Source: Ruud van Halewyn and Robert L. Norton, "The status and conservation of seabirds in the Caribbean," in J.P. Croxall, P.G.H. Evans, and R.W. Schreiber (eds.), "Status and conservation of the world's seabirds," *ICBP Technical Publication*, No. 2 (ICBP: Cambridge, 1984), pp. 175-176.

Appendix G1.--Cuba. Glossary of species involved in the longline fishery

Species		
English	Spanish (Cuban)**	Scientific
Billfish	Agujas/Casteros***	
Marlin	Casteros***	
Blue	Castero	Makaira nigricans
Black	Castero	M. indica
White	Aguja blanca/paladar	Tetrapturus albidus
Sailfish	Aguja prieta/voladora	Istiophorus platypterus
Spearfish, longbill	Aguja del Pacífico	T. pfluegeri
Dorado/dolphin	Dorado	Coryphaena hippurus
Mackerels	Macarelas	
Horse	Caballa	Scomber scombrus
Jack (Chilean)	Jurel Chileno	Trachurus murphyi
King	Serrucho	Scomberomorus cavalla
Spanish	Sierra	S. maculatus
Sharks	Tiburones	
Bignose	Baboso	Carcharhinus altimus
Blue	Azul	Prionace glauca
Bull	Cabeza de batea	C. leucas
Dogfish	Escualos	
Cuban	Galludo	Squalus cubensis
Spiny	NA	S. acanthias
Dusky	Amarillo	C. obscurus
Florida smoothhound	Mamón	Mustelus norrisi
Hammerheads	Cornudas	Sphyrna spp.
Lemon	Galano de ley	Negaprion brevirostris),
Mako	Dientuso	Isurus
Longfin	Prieto	I. paucus
Shortfin	Azul	I. oxyrinchus
Night	Jesuita/noche	C. signatus*
Nurse	Gata	Ginglymostoma cirratum
Oceanic whitetip	Galano	C. longimanus
Reef	Cabeza dura	C. perezil
Sandbar	Arenero	C. plumbeus
Silky	Jaquetón	C. falciformis
Six gill	Marrajo	Hexanchus griseus
Six gill	Marrajo chico	H. vitulus
Thresher		
Bigeye	Zorro	Alopias superciliosus
Tiger	Tigre	Galeocerdo cuvieri
Swordfish	Emperador/pez espada	Xiphias gladius
Tunas	Atunes	Thunnus sp.
Albacore	Albacora	T. alalunga
Bigeye	Ojo grande/patudo	T. obesus
Black skipjack	Albacora	T. atlanticus
Bluefin	Aleta azul/magró###	T. thynnus
Skipjack	Bonito/listado	Katsuwonus pelamis
Yellowfin	Aleta amarilla/rabil	T. albacares
Turtles	Tortugas	
Green##	Verde	Chelonia mydas
Hawksbill##	Carey	Eretmochelys imbricata
Leatherback	Tinglado	Dermochelys coriacea
Loggerhead	Caguama/bobo	Caretta caretta
Wahoo	Peto	Acanthocybium solanderi

NA - Not available
* Formerly identified as *Hypoprion signatus*
** There are considerable differences between Cuba and Mexico in the Spanish language names used for many of these species, especially the sharks.
*** The term castero can be confusing. The Cubans often use it to refer to blue marlin. It is also sometimes used for marlins in general or all billfish in general.
# Catch per unit effort in kilograms per fishing day.
These turtles are not known to be taken in the longline fishery, but are included here because they are mentioned in the text.
ICCAT uses the Spanish term "atún rojo" (red tuna) and FAO uses "atún comun".
Source: Dario Guitart Manday, "La pesquerias pelagico-oceanicas de corto radio de accion en la region noroccidental de Cuba," *Serie Oceanologica*, No. 31, 1975, p.5; Jorge Pol and Sonia Moreno, "Los palangres en la Flota del Golfo," *Mar y Pesca*, 1986, no. 252, pp. 32-37; and other sources.

Appendix G2.--Cuba. Glossary of Spanish terms

Spanish	English
Alambrada	Wire hook line
Anzuelo	Hook
Arte de pesca	Fishing gear
Associaciones Provinciales de Pesca	Provincial Fishing Associations
Al Rojo Vivo Emulación	Red Hot Emulation
Bajante de boya	Line attaching buoy to mainline
Bandas	Band cuts
Barcos plasticos	Fiberglass boats
Boya	Buoy, can be glass (cristal) or plastic (plastico)
Braza	Fathom (6 feet)
Brazoladas	Hook lines
Boniteros	Live-bait or baitboats
Buque insignia	Flag-ship
Carnada	Bait
Carniceria	Butchery
Cartilla	Ration book
Cayos	Cays
Chicharro	Fish gear for clupeidae
Cochamberas	Fish gear for snapper
Combinados Pesqueros	Vertically integrated enterprisescayos
Consumo nacional	Domestic consumption
Corrida	Season or run
Curricán	Troll line
Emalle	Gillnet
Establecimiento	Establishment
Exportación en frontera	Domestic sales in foreign currency
Ferro-cemento	Iron-cement construction (used for boats)
Fondo del alto	Highseasbottom longline fishery
Lance	Set
Libreta	Ration book
Linea madre	Mainline
Pescaderías modelos	Model fish stores
Malla	Mesh
Mechon	Kerosene lamps on longline bouy platforms
Motopesqueo	Motorized boat
Paladrares	Small private restaurants
Palangre	Longline
Palangrero	Longliner
Palangrazo	Longline set
Período Especial en Tiempo de Paz	Special Period in Peace Time
Plataforma	Shelf
Quitavueltas	Swivel line clip
Ramesas	Money sent to families in Cuba
Red	Net
Reinal	Spacing between hook lines
Shopins	Government supermarkets
Tableros	Floating platform
Vara y cordel	Pole and line (used in the baitboat fishery)
Vela	Sail

Source: Various

Appendix G3.--Cuba. Glossary of acronyms

Acronym	Spanish	English
ACEPEX	NA*	MIP purchasing agent
AGECREW	NA*	Highseas crew employment agency
APP	Asociación Provincial Pesquera	Provincial Fishing Association
CARIBEX	NA*	Fisheries export company
CDR	Comite para la Defensa de la Revolución	Committee for the Defense of the Revolution
CIP	Centro de Investigaciones Pequeras	Fisheries Research Center
EU	Union Europeo	European Union
FAC	Flota Atunera de Cuba	Cuban Tuna Fleet
FCP**	Flota Cubana de Pesca	Cuban (Highseas) Fishing Fleet
FG	Flota del Golfo	Cuban Gulf Fleet
FLOPESCA**	Flota Cubana de Pesca	Cuban Fishing Fleet
FP	Flota de la Plataforma	Shelf Fleet
INP***	Instituto Nacional de Pesca	National Fisheries Institute
MIP	Ministerio se la Industria Pesquera	Ministry of the Fishing Industry
PCC	Partido Comunista Cubana	Cuban Communist Party
PESPORT	NA*	Offshore fleet*****
PNTM	Programa Nacional de Tortugas Marinas	National Sea Turtle Program
SDPE	Sistema de Planificación Económica****	System of Economic Management and Planning
TED	Aparato para evitar la captura de tortugas	Turtle Excluder Device
UH	Universidad de Habana	Havana University

* Several of the Cuban companies do not commonly use the extended name.
** FLOCUBA was not commonly used in Cuba, but some articles use this acronym. The Cubans referred to the highseas fleet as the FCP.
*** Early term for the Cuban fisheries agency which was raised to ministerial status as the MIP.
**** SDPE is the Cuban acronym, but we are not sure what the actual Spanish extension is.
***** PESPORT has taken over management of the offshore fleet. Offshore operations were formerly conducted by FLOCUBA, FAC, and FG. The vessels they operated have been mostly sold and PESPORT is operating with a smaller number of Cuban and joint-venture vessels.
Source: Various

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